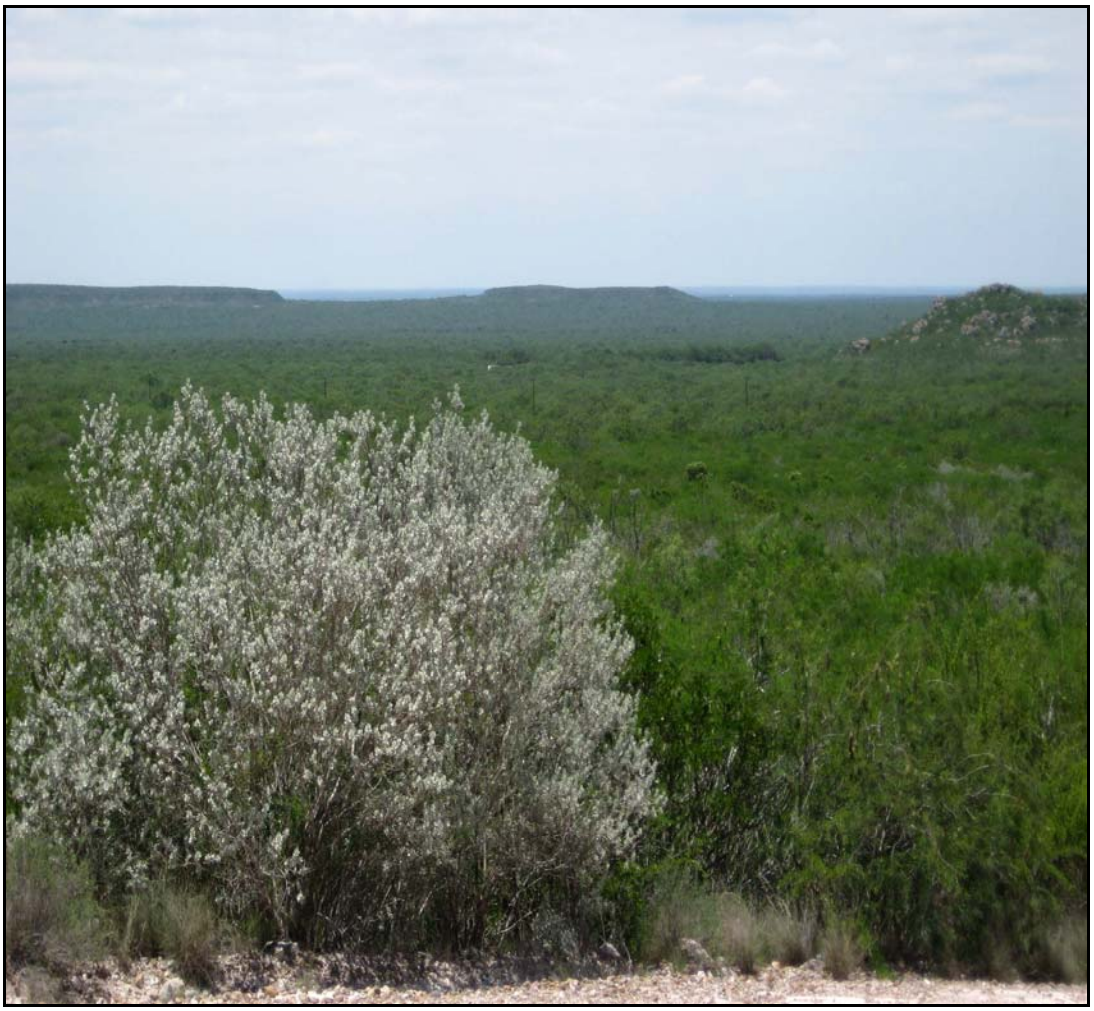
United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Texas AgriLife Research

Soil Survey of Duval County, Texas



How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

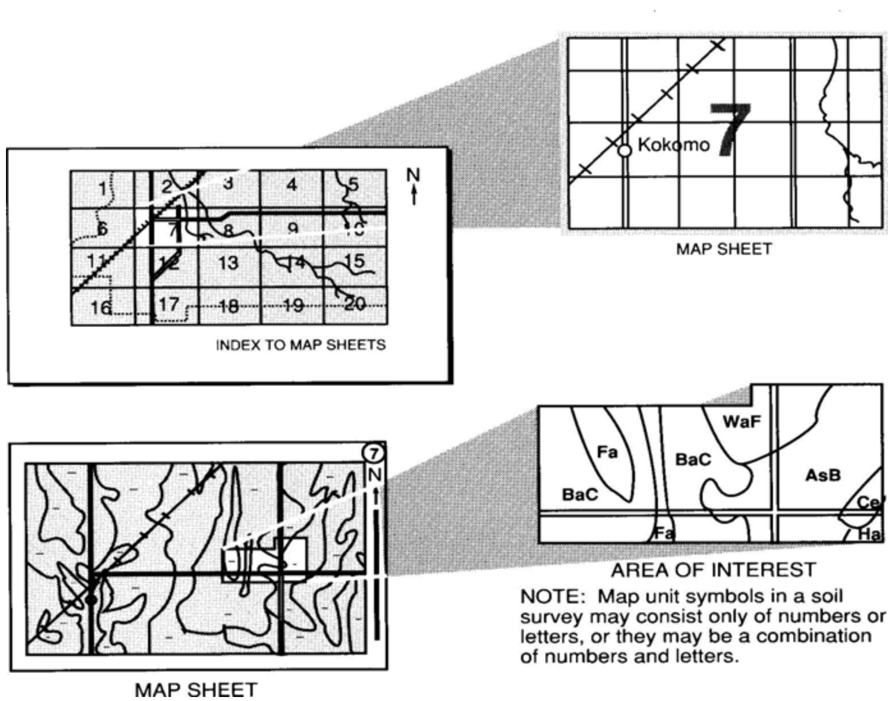
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and go to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Go to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including AgriLife Research, and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 2008. Soil names and descriptions were approved in 2008. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2008. This survey was made cooperatively by the Natural Resources Conservation Service and Texas AgriLife Research. The survey is part of the technical assistance furnished to the Agua Poquita Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Landscape of the Catahoula Formation in Northern Duval County.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is *http://www.nrcs.usda.gov*

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Issued 2011

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or Texas AgriLife Extension Service.

Salvador Salinas

Salvador Salinas
State Conservationist
Natural Resources Conservation Service

Soil Survey of Duval County, Texas

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Fieldwork by Paul Holland, Ramiro Molina, Alan Stahnke, Roel Guerra, Jr., Dennis Brezina, Jamey Douglass, Shanna Dunn, John Sackett , and Nathan Haile

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Texas AgriLife Research

Duval County is located in south Texas. (fig. 1) It is bordered on the north by McMullen and Live Oak Counties; east by Jim Wells County; south by Brooks and Jim Hogg Counties; and to the west by Webb County. The three largest towns are San Diego, Freer, and Benavides. San Diego is the county seat with a population of about 4,100. It is on the eastern edge of Duval County and is about 52 miles west of Corpus Christi and 80 miles east of Laredo. The elevation of the county ranges from 250 to 800 feet above sea level. The county has a land area of 1,148,845 acres or 1,795 square miles.

Duval County lies within the Rio Grande Plain Major Land Resource Area. The topography is mainly gently undulating. The northern part of the county drains into the Nueces River, and the central and southern parts drain into the Laguna Madre through Baffin Bay.

The vegetation consists of small trees, shrubs, and cacti, with large areas of brush. The county's mineral resources include caliche, clay, salt domes, sandstone, uranium, oil, and gas. Most of the county is rangeland. There is some land used for crop production, and the main crops are grain sorghum, forage sorghum, and cowpeas. Oil and gas production are the largest nonagricultural industries in the county. About 85 percent of the county is in rangeland, 2 percent in cropland, 3 percent in improved pasture land, and the remaining 10 percent in urban and other uses.

In 1982, 83 percent of Duval County's estimated population of 12,900, were of Hispanic origin, the eighth-highest percentage in the United States; 7 percent were of English descent, 5 percent of German descent, and 5 percent of Irish descent.

Tourists are attracted by such events as Freer's annual Rattlesnake Roundup in April and Old Fiddlers Contest in July.

General Nature of the Survey Area

This section provides general information about Duval County. It describes the history, agriculture, and climate of the survey area.

History

The Venado Indians, a Coahuiltecan hunting and gathering group, roamed the area in the 1700s. The seminomadic Coahuiltecans hunted bison, deer, javelinas, and smaller mammals, as well as snakes, lizards, terrapins, and other reptiles. They also gathered wild fruits, nuts, berries, seeds, roots, leaves, and pricklypear tunas. They were disrupted by the Apache and Comanche incursions from the north and by the Spanish pushing

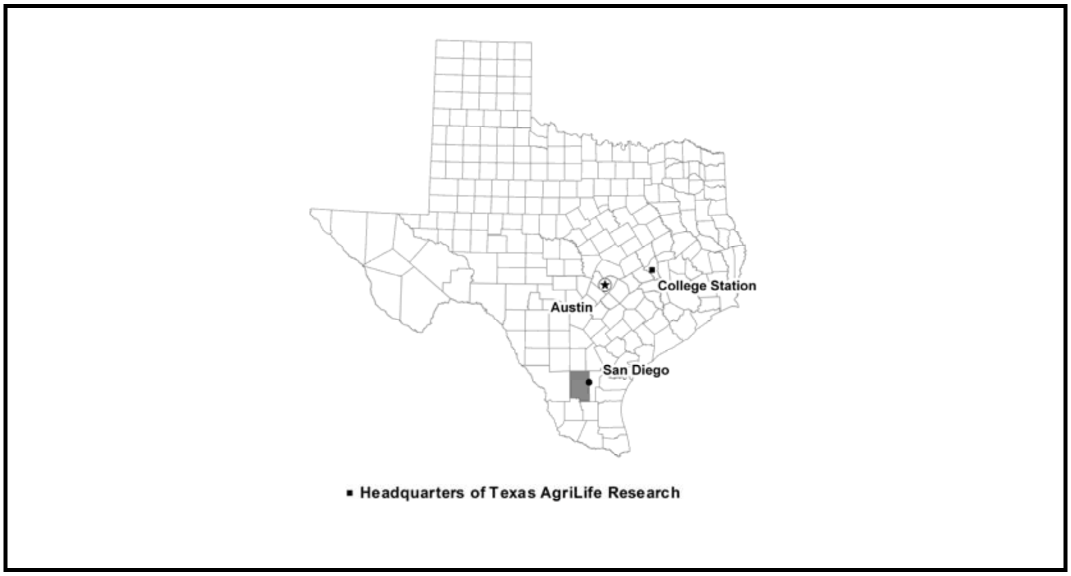

Figure 1.—Location of Duval County, Texas.

north from Mexico. European exploration of the area apparently began in the eighteenth century, as the road between Mier and Goliad passed through the area. In 1848 Ventura Flores sold some land on San Diego Creek to Pablo Pérez.

The community Perez established there, called Perezville, was the precursor of San Diego. Also in 1848 Henry Lawrence Kinney and William Leslie Cazneau cut a road from Corpus Christi to Laredo that passed through San Diego.

In 1858 the Texas legislature formed Duval County, which originally embraced 1,887 square miles, from parts of Nueces, Live Oak, and Starr counties. County organization did not occur until eighteen years later. The county was named for Burr H. Duval, who fought in the Texas Revolution and was killed in the Goliad Massacre. The county was finally organized in 1876, and San Diego was selected as the county seat.

Agriculture

The Corpus Christi, San Diego and Rio Grande Narrow Gauge Railroad reached the county in 1879, and in 1881, after being taken over by the Texas Mexican Railroad, built across the county and on to Laredo, in Webb County. The arrival of the railroad accelerated the sheep boom. Between 1873 and 1883 Duval County reportedly had more sheep than any other county in the United States. In 1880 county ranchers reported 196,684 sheep.

In the late nineteenth century ranching was Duval County's most important industry. The county's 168 farms in 1880, had an average size of 2,871 acres, and the county had 6,572 acres of improved farmland. In 1982 there were 1,074 farms, averaging 904 acres. Mexican-American ranchers were growing cotton experimentally in Duval County in the 1880s, but by 1900 the county's production totaled only 638 bales. Production climbed to 11,773 by 1930, when 55,943 of the county's 67,473 acres of harvested cropland was devoted to cotton.

Duval County produced 1,142,407 pounds of peanuts in 1969, but by 1982 the local harvest had declined to insignificance. In 1982 Duval County ranked ninth in the state in the production of peaches, with 9,500 bushels, and third in the state in the production of dry cowpeas and dry southern peas, with 24,460 bushels. Cash receipts from crops and livestock ranked the county, 135th in the state.

Economy

Oil was discovered in the county in 1905, but not until a wildcat well came in near Freer in October 1928 did a full-scale oil boom occur. By 1938 Duval County ranked third among the state's 254 counties in oil production, and by 1940 the population of the county reached an all-time high of 20,565. The oil boom in Duval County did not last. From its peak of 20,289,399 barrels in 1938, production dropped steadily. By 1988 Duval County ranked fifty-third in the state, with 3,061,639 barrels.

Climate

Prepared by the Natural Resources Conservation Service National Water and Climate Center, Portland, Oregon

Climate tables are created from the climate station at Freer, Texas.

Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from First Order station Corpus Christi, Texas.

Table 1 provides data on temperature and precipitation for the survey area as recorded at Freer in the period 1971 to 2000. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 57 degrees F and the average daily minimum temperature is 44 degrees. The lowest temperature on record, which occurred at Freer on January 24, 1963, was 12 degrees. In summer, the average temperature is 84 degrees and the average daily maximum temperature is 95 degrees. The highest temperature, which occurred at Freer on August 18, 1969, was 109 degrees.

Growing degree days are shown in Table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation is about 27 inches. Of this, about 24 inches, or 92 percent, usually falls in February through November. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.0 inches at Freer on August 31, 1987. Thunderstorms occur on about 29 days each year, and most occur between May and September.

The average seasonal snowfall is 0.2 inch. The greatest snow depth at any one time during the period of record was about 5 inches recorded on January 10, 1967. On an average, less than one day each year has at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 6.5 inches recorded on January 10, 1967.

The average relative humidity in mid-afternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines about 78 percent of the time in summer and about 52 percent in winter. The prevailing wind is from the south. Average wind speed is highest, around 12 miles per hour, in February and March.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineation’s of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Piedras-Benavides-Delmita

Well drained, moderately permeable, shallow to very deep soils

This map unit makes up about 23 percent of the survey area. It is about 24 percent Piedras soils, 20 percent Benavides soils, 15 percent Delmita soils, and 41 percent other soils.

The map unit typically is on interfluves and ridges. Slope ranges from less than 1 percent to about 8 percent. The soils formed from reworked sediments derived from the Goliad Formation.

Piedras and Delmita soils are on summits and side slopes of interfluves and ridges. Benavides soils are generally on side slopes of interfluves and ridges.

Of minor extent in this map unit are Olmedo, Cuevitas, Weesatche, Alet, Czar, and Clareville soils. Olmedo and Cuevitas soils are similar to Piedras, and are on ridges and interfluves. Weesatche soils are on side slopes of interfluves and ridges. Alet, Czar, and Clareville soils are in drains.

These soils are used almost exclusively for livestock grazing and wildlife habitat.

2. Piedras-Delmita

Well drained, moderately permeable, shallow and moderately deep soils

This map unit makes up about 19 percent of the survey area. It is about 39 percent Piedras soils, 22 percent Delmita soils, and 39 percent other soils.

The map unit typically is on interfluves and ridges. Slope ranges from less than 1 percent to about 8 percent. The soils formed from reworked sediments derived from the Goliad Formation.

Piedras and Delmita soils are on summits and side slopes of interfluves and ridges.

Of minor extent in this map unit are Olmedo, Cuevitas, Benavides, Weesatche, Alet, Czar, and Clareville soils. Olmedo and Cuevitas soils are similar to Piedras, and are on ridges and interfluves. Weesatche and Benavides soils are on side slopes of interfluves and ridges. Alet, Czar, and Clareville soils are in drains.

These soils are used almost exclusively for livestock grazing and wildlife habitat.

3. Houla-Salco-Lomart

Well drained, moderately permeable, moderately deep to very deep soils

This map unit makes up about 12 percent of the survey area. It is about 29 percent Houla soils, 13 percent Salco soils, 13 percent Lomart soils, and 45 percent other soils (fig. 2).

The map unit typically is on interfluves, ridges, and other erosion remnants. Slope ranges from less than 1 percent to 5 percent. The soils formed from loamy, calcareous sandstone of the Catahoula Formation, with some alluvial influences in some areas.

Houla soils are on broad flats and footslope positions of interfluves and erosion remnants. Lomart soils are in higher positions on footslopes and side slopes of interfluves. Salco soils are on backslope and footslope positions on interfluves and sometimes high stream terraces.

Of minor extent in this map unit are Mirasol, Aguilares, and Tela soils. Mirasol soils are on cuestas. Aguilares soils are on broad interfluves. Tela soils are in drainageways.

These soils are used almost exclusively for livestock grazing and wildlife habitat.

4. Delmita-Delfina-Colmena

Well drained, moderately slowly and moderately permeable, moderately deep to very deep soils

This map unit makes up about 10 percent of the survey area. It is about 24 percent Delmita soils, 16 percent Delfina soils, 14 percent Colmena soils, and 46 percent other soils (fig. 3).

The map unit is typically on paleoterraces and interfluves. Slope ranges from less than 1 percent to 3 percent. The soils formed in loamy alluvium.

Delmita soils are summits and side slopes of interfluves and ridges. Delfina soils are crests of paleoterraces. Colmena soils are on all positions on paleoterraces.

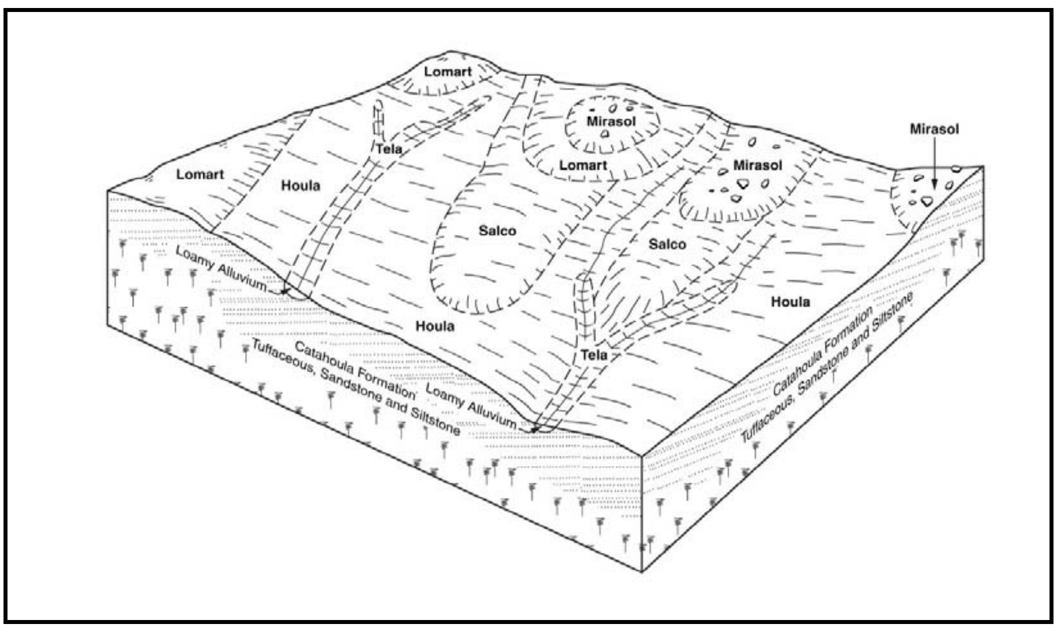

Figure 2.—Pattern of soils and underlying material in the Houla-Salco-Lomart general soil map unit.

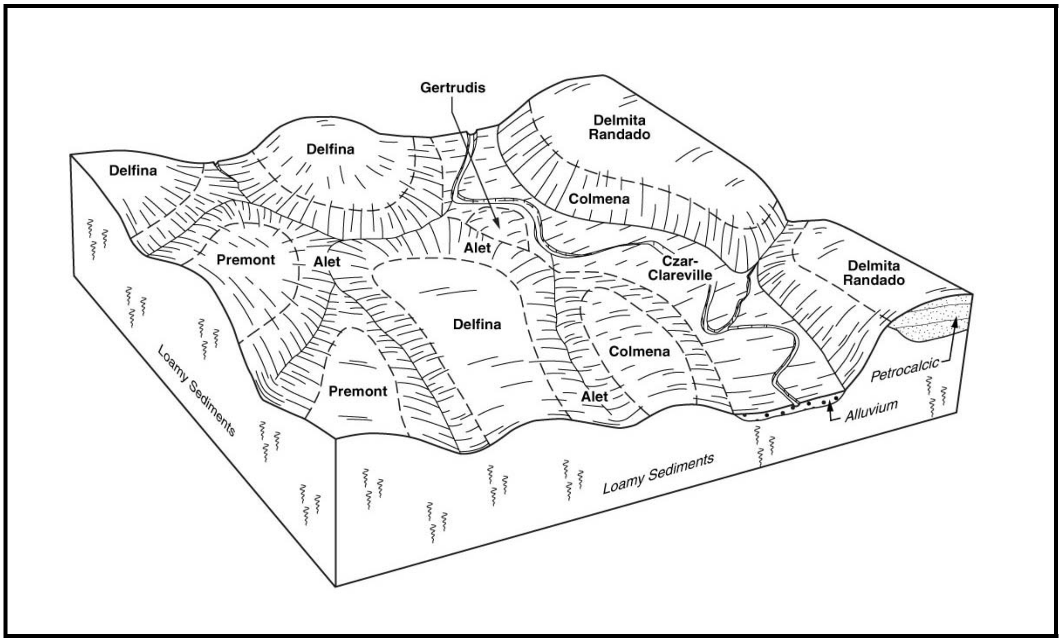

Figure 3.—Pattern of soils and underlying material in the Delmita-Delfina-Colmena general soil map unit.

Of minor extent in this map unit are Weesatche, Alet, Czar, and Clareville soils. Weesatche soils are on similar positions as Colmena soils. Alet, Czar, and Clareville soils are in drains.

These soils are used mostly for livestock grazing and wildlife habitat, but some areas are used for crop production.

5. Piedras-Benavides-Grava

Well drained, moderately permeable, moderately deep to very deep soils

This map unit makes up about 8 percent of the survey area. It is about 23 percent Piedras soils, 22 percent Benavides soils, 21 percent Grava soils, and 34 percent other soils.

The map unit is typically on interfluves and ridges. Slope ranges from less than 1 percent to about 8 percent. The soils formed from reworked sediments derived from the Goliad Formation.

Piedras and Grava soils are on summits and side slopes of interfluves and ridges. Benavides soils are generally on side slopes of interfluves and ridges.

Of minor extent in this map unit are Olmedo, Cuevitas, Weesatche, Alet, Czar, and Clareville soils. Olmedo and Cuevitas soils are similar to Piedras, and are on ridges and interfluves. Weesatche soils are on side slopes of interfluves and ridges. Alet, Czar, and Clareville soils are in drains.

These soils are used almost exclusively for livestock grazing and wildlife habitat.

6. Benavides-Olmedo-Weesatche

Well drained, moderately permeable, shallow to very deep soils.

This map unit makes up about 7 percent of the survey area. It is about 36 percent Benavides soils, 20 percent Olmedo soils, 14 percent Weesatche soils, and 30 percent other soils (fig. 4).

The map unit is typically on interfluves and ridges. Slope ranges from less than 1 percent to about 8 percent. The soils formed from reworked sediments derived from the Goliad Formation.

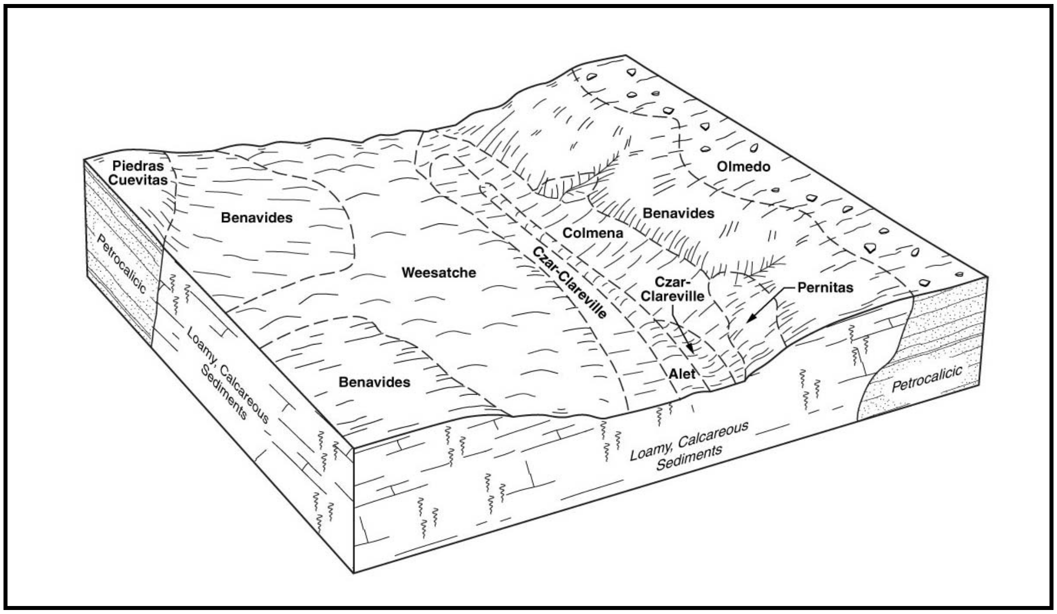

Figure 4.—Pattern of soils and underlying material in the Benavides-Olmedo-Weesatche general soil map unit.

Benavides and Weesatche soils are generally on side slopes of interfluves and ridges. Olmedo soils are on summits and side slopes of interfluves and ridges. Of minor extent in this map unit are Cuevitas, Alet, Czar, and Clareville soils. Cuevitas soils are on ridges and interfluves. Alet, Czar, and Clareville soils are in drains.

These soils are used mostly for livestock grazing and wildlife habitat.

7. Delfina-Delmita-Nueces

Well drained, moderately permeable, moderately deep to very deep soils

This map unit makes up about 7 percent of the survey area. It is about 40 percent Delfina soils, 27 percent Delmita soils, 19 percent Nueces soils, and 14 percent other soils (fig. 5).

The map unit is typically on paleoterraces and interfluves near a sandsheet prairie. Slope ranges from less than 1 percent to 3 percent. The soils formed in loamy alluvium, with eolian influence.

Delmita soils are on summits and side slopes of interfluves and ridges. Delfina soils are crests of paleoterraces. Nueces soils are on sandsheet prairies.

Of minor extent in this map unit are Alet, Czar, and Clareville soils, and they are in drains.

These soils are used mostly for livestock grazing and wildlife habitat with a few areas used for crop and forage production.

8. Benavides-Pernitas-Olmedo

Well drained, moderately permeable, shallow to very deep soils

This map unit makes up about 6 percent of the survey area. It is about 29 percent Benavides soils, 18 percent Pernitas soils, 14 percent Olmedo soils, and 39 percent other soils (fig. 6).

The map unit is typically on interfluves and ridges. Slope ranges from less than 1 percent to about 8 percent. The soils formed from reworked sediments derived from the Goliad Formation.

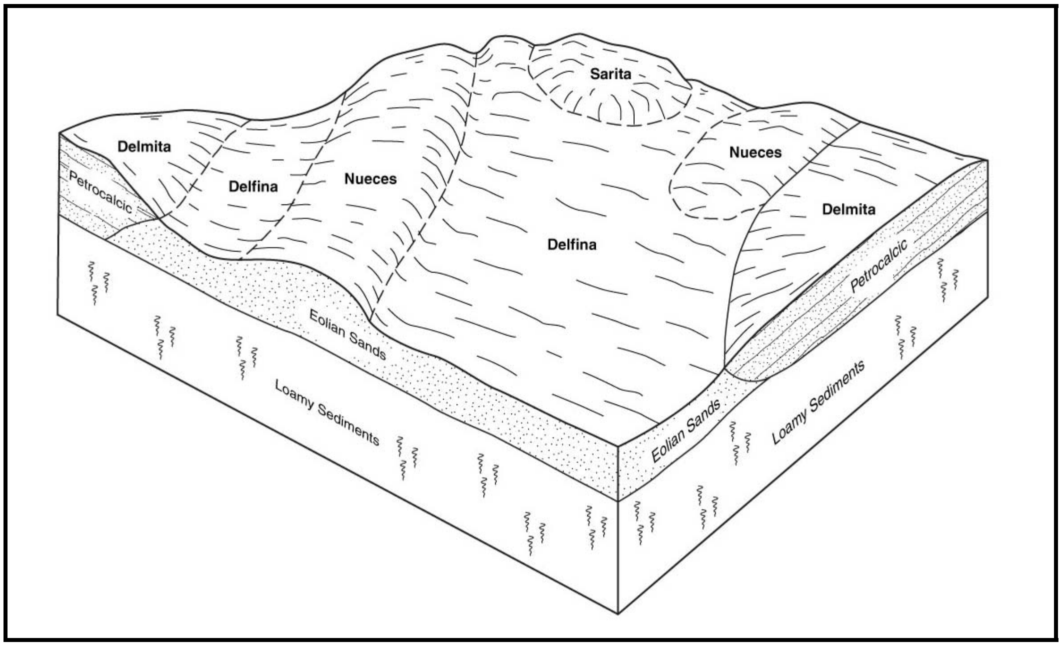

Figure 5.—Pattern of soils and underlying material in the Delfina-Delmita-Nueces general soil map unit.

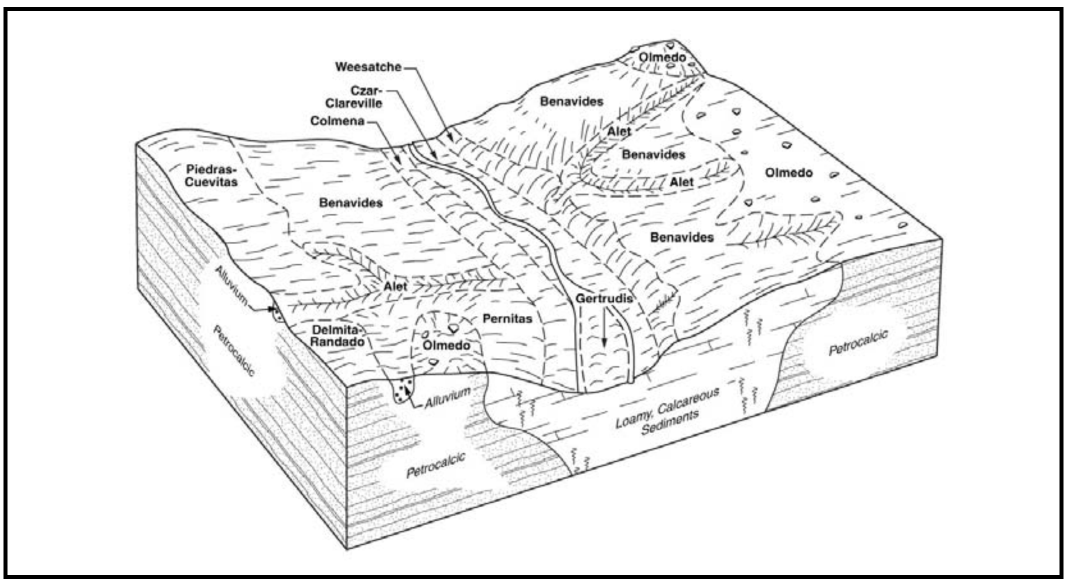

Figure 6.—Pattern of soils and underlying material in the Benavides-Pernitas-Olmedo general soil map unit.

Benavides and Pernitas soils are generally on side slopes of interfluves and ridges. Olmedo soils are on summits and side slopes of interfluves and ridges.

Of minor extent in this map unit are Piedras, Cuevitas, Weesatche, Alet, Czar, and Clareville soils. Piedras and Cuevitas soils are similar to Olmedo, and are on ridges and interfluves. Weesatche soils are on side slopes of interfluves and ridges. Alet, Czar, and Clareville soils are in drains.

These soils are used mostly for livestock grazing and wildlife habitat.

9. Aguilares-Moglia-Tela

Well drained, moderately permeable, very deep soils

This map unit makes up about 6 percent of the survey area. It is about 30 percent Aguilares taxadjunct soils, 13 percent Moglia soils, 12 percent Tela soils, and 45 percent other soils (fig. 7).

The map unit is typically on interfluves, including drainageways between interfluves. Slope ranges from less than 1 percent to 5 percent. The soils formed in residuum from Jackson Formation sediments and alluvium.

Aguilares taxadjunct and Moglia soils are on interfluves, and Tela soils are in drainageways.

Of minor extent in this map unit are Copita, Catarina, and Monwebb soils. Copita soils are on interfluves, and the Catarina and Monwebb soils are on valley sides, valley floors, and valley flats.

These soils are used mostly for livestock grazing and wildlife habitat.

10. Delmita-Piedras

Well drained, moderately permeable, shallow and moderately deep soils

This map unit makes up about 2 percent of the survey area. It is about 46 percent Delmita soils, 19 percent Piedras soils, and 35 percent other soils.

The map unit typically is on interfluves and ridges. Slope ranges from less than 1 percent to about 8 percent. The soils formed from reworked sediments derived from the Goliad Formation.

Delmita and Piedras soils are on summits and side slopes of interfluves and ridges.

Of minor extent in this map unit are Olmedo, Cuevitas, Benavides, Weesatche, Alet, Czar, and Clareville soils. Olmedo and Cuevitas soils are similar to Piedras, and are on ridges and interfluves. Weesatche and Benavides soils are on side slopes of interfluves and ridges. Alet, Czar, and Clareville soils are in drains.

These soils are used almost exclusively for livestock grazing and wildlife habitat.

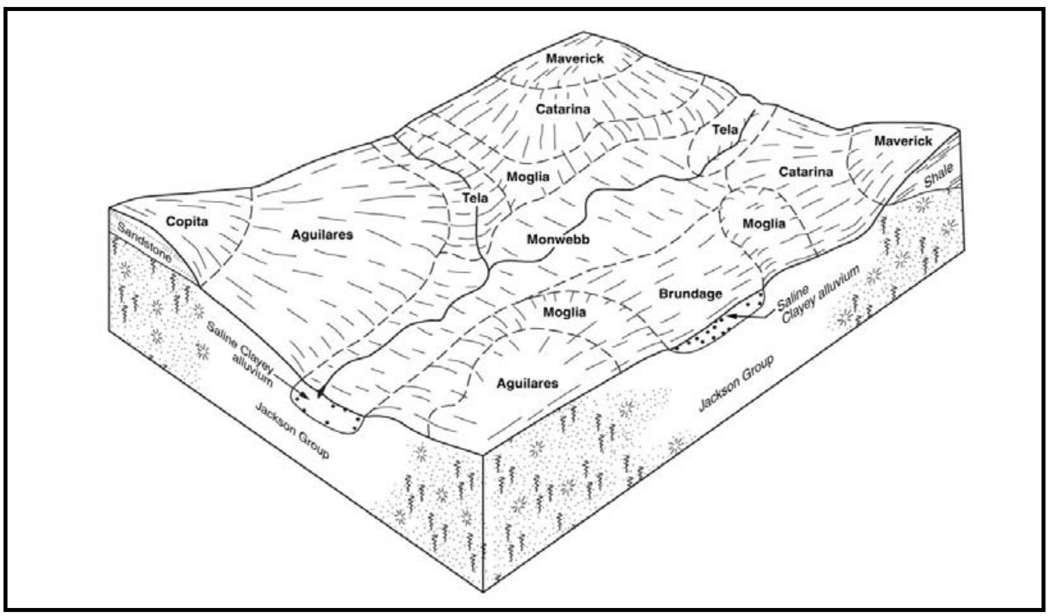

Figure 7.—Pattern of soils and underlying material in the Aguilares-Moglia-Tela general soil map unit.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and provides the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Brennan loamy fine sand, 1 to 5 percent slopes is a phase of the Brennan series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Delmita-Randado complex, 0 to 3 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Ps—Pits, quarry, is an example.

Table 4 shows the acreage and proportionate extent of each map unit in this survey area. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

A complete soil description with range in characteristics is included, in alphabetical order, in the "Soil Series and Morphology" section. Composition is based on observations, descriptions, and or transects of the map unit. Additional information specific to the components of this map unit is available in the Tables section. For more information about managing a map unit, see the section on "Soil Properties", and the section on "Use and Management" which includes subsections on "Crops and Pasture", "Engineering", "Rangeland", "Recreation", and "Wildlife Habitat".

AgC—Aguilares fine sandy loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 410 to 655 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 280 to 325 days
Map unit prime farmland class: Not prime farmland

Composition

Aguilares and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Aguilares
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous loamy residuum weathered from sandstone

Typical Profile

A—0 to 4 inches; slightly alkaline fine sandy loam
Bk1—4 to 10 inches; moderately alkaline fine sandy loam
Bk2—10 to 27 inches; moderately alkaline fine sandy loam
BCk—27 to 80 inches; moderately alkaline gravelly sandy clay loam

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Paralithic bedrock at 71 to 79 inches

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Saline
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 6.3 inches (Moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site name: Gray Loamy Upland 18-25" PZ
Ecological site number: R083BY420Texas
Typical vegetation: Native woody species include guajillo, blackbrush, coma, and mesquite. Native grass species include fourflower trichloris, plains bristlegrass, Arizona cottontop, and pink pappusgrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

AlA—Alet sandy clay loam, 0 to 1 percent slopes, rarely flooded

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 300 to 700 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Alet and similar soils: 85 percent
Contrasting soils: 15 percent

Soil Description

Alet
Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Loamy alluvium and/or colluvium

Typical Profile

A—0 to 7 inches; slightly alkaline sandy clay loam
Bt—7 to 46 inches; moderately alkaline sandy clay loam and clay loam
Btk—46 to 80 inches; moderately alkaline clay loam and sandy clay loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)

Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.2 inches (High)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Rare
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: 1
Ecological site name: Loamy Bottomland 20-35" PZ
Ecological site number: R083CY462Texas
Typical vegetation: Native woody species include mesquite, sugar hackberry, spiny hackberry, huisache, pricklypear, and whitebrush. Native grass species include fourflower trichloris, Arizona cottontop, sideoats grama, plains bristlegrass, hooded windmillgrass, and prairie threeawn.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are in forage production and crop production. The main crops grown are grain sorghum and forage sorghum. Some areas are in cotton and corn.

AnC—Annarose fine sandy loam, 2 to 5 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 245 to 645 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 285 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Annarose and similar soils: 80 percent
Contrasting soils: 20 percent

Soil Description

Annarose
Landscape: Inland, dissected coastal plains
Landforms: Ridges
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum derived from sandstone

Typical Profile

A—0 to 9 inches; moderately alkaline fine sandy loam
Bw—9 to 25 inches; moderately alkaline sandy clay loam
Bk—25 to 43 inches; moderately alkaline sandy clay loam and fine sandy loam
BCk—43 to 50 inches; moderately alkaline fine sandy loam
Cd—50 to 80 inches; moderately alkaline noncemented sandstone bedrock

Properties and Qualities

Slope: 2 to 5 percent
Percent of area covered by surface fragments: None
Depth to first restrictive layer: Densic material: 40 to 60 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.4 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456Texas
Typical vegetation: Native woody species include guajillo, mountain laurel, palo verde, mesquite, and agarita. Native grass species include twoflower trichloris and fourflower trichloris, pink pappusgrass, plains bristlegrass, hooded windmillgrass, and lovegrass tridens.

Use and Management

The major land uses for this soil are livestock production and wildlife habitat.

BdC—Benavides fine sandy loam, 2 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 300 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 340 to 360 days
Map unit prime farmland class: Not prime farmland

Composition

Benavides and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Benavides
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Linear, convex
Across-slope shape: Convex, concave
Parent material: Calcareous loamy residuum of the Goliad Formation

Typical Profile

A—0 to 8 inches; moderately alkaline fine sandy loam
Bk1—8 to 26 inches; moderately alkaline sandy clay loam

Bk2—26 to 50 inches; moderately alkaline clay loam
BCk—50 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 2 to 5 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.4 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456Texas
Typical vegetation: Native woody species include mountain laurel, mesquite, hog plum, ceniza, guayacan, pricklypear, coyotillo, amargosa, and catclaw. Native grass species include plains bristlegrass, hooded windmillgrass, pink pappusgrass, Arizona cottontop, twoflower trichloris, and fourflower trichloris.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for forage production.

BnC—Brennan loamy fine sand, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83E—Sandsheet Prairie
Elevation: 245 to 400 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 340 to 360 days
Map unit prime farmland class: Not prime farmland

Composition

Brennan and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Brennan
Landscape: Inland, dissected coastal plains
Landforms: Vegetated sandsheets
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Eolian sands over calcareous loamy alluvium

Typical Profile

A—0 to 5 inches; neutral loamy fine sand
Bt1—5 to 15 inches; slightly alkaline fine sandy loam
Bt2—15 to 40 inches; slightly alkaline sandy clay loam
Btk—40 to 49 inches; moderately alkaline fine sandy loam
Bk—49 to 80 inches; moderately alkaline fine sandy loam

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.1 inches (Moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083EY702Texas
Typical vegetation: Native woody species include mesquite, Texas ebony, spiny hackberry, guayacan, lotebush, and pricklypear. Native grass species include twoflower trichloris, Arizona cottontop, plains bristlegrass, hooded windmillgrass, and pink pappusgrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are in forage production and crop production. The main crops grown are grain sorghum.

BrB—Brennan fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83E—Sandsheet Prairie
Elevation: 245 to 400 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 270 to 340 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Brennan and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Brennan
Landscape: Inland, dissected coastal plains
Landforms: Vegetated sandsheets

Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Eolian sands over calcareous loamy alluvium

Typical Profile

A—0 to 12 inches; neutral fine sandy loam
Bt—12 to 51 inches; neutral and moderately alkaline sandy clay loam
Bk—51 to 65 inches; moderately alkaline sandy clay loam
BCk—65 to 80 inches; moderately alkaline fine sandy loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.9 inches (Moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3c
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083EY702Texas
Typical vegetation: Native woody species consist of mesquite, Texas ebony, spiny hackberry, guayacan, lotebush, and pricklypear. Native grass species include twoflower trichloris, Arizona cottontop, plains bristlegrass, hooded windmillgrass, and pink pappusgrass.

Use and Management

The major land uses for this soil are livestock grazing, forage production, and wildlife habitat. Some areas are used for crop production and some of the crops grown are grain sorghum, cotton, and corn.

BuA—Brundage fine sandy loam, 0 to 2 percent slopes, rarely flooded

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 600 to 895 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 280 to 325 days
Map unit prime farmland class: Not prime farmland

Composition

Brundage and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Brundage
Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sodic, loamy alluvium of quaternary age

Typical Profile

A—0 to 3 inches; slightly acid fine sandy loam
Btn—3 to 9 inches; slightly alkaline sandy clay loam
Btknz—9 to 38 inches; moderately alkaline sandy clay loam
BCknz—38 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Saline
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 4.7 inches (Low)
Natural drainage class: Moderately well drained
Runoff: Medium
Flooding frequency: Rare
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 6s
Ecological site name: Claypan Prairie 18-25" PZ
Ecological site number: R083BY417Texas
Typical vegetation: Native woody species include mesquite, pricklypear, and spiny hackberry. Native grass species include plains bristlegrass, false Rhodesgrass, Arizona cottontop, buffalograss, pinhole bluestem, pink pappusgrass, sideoats grama, vine-mesquite, curly-mesquite, Texas wintergrass, and lovegrass tridens.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

CaA—Catarina clay, 0 to 1 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 295 to 800 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Catarina and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Catarina
Landscape: Inland, dissected coastal plains
Landforms: Valley sides, valley floors
Geomorphic positions, two-dimensional: Backslope, toeslope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Calcareous, saline clayey alluvium

Typical Profile

Ay—0 to 3 inches; slightly alkaline clay
Bnssy—3 to 14 inches; slightly alkaline clay
Bknssyz—14 to 73 inches; slightly alkaline clay
Bknyz—73 to 80 inches; slightly alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Saline
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 4.6 inches (Low)
Natural drainage class: Moderately well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 6s
Ecological site name: Saline Clay 18-25" PZ
Ecological site number: R083BY432Texas
Typical vegetation: Native woody species include mesquite and pricklypear. Native grass species include trichloris, alkali sacaton, bristlegrass, vine-mesquite, whiplash pappusgrass, curly-mesquite, buffalograss, Arizona cottontop, tobosagrass, and white tridens.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

CmB—Colmena fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 245 to 750 feet
Mean annual precipitation: 24 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 320 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Colmena and similar soils: 85 percent
Contrasting soils: 15 percent

Soil Description

Colmena
Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Footslope
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Loamy alluvium over calcareous loamy alluvium of Quaternary age

Typical Profile

A—0 to 11 inches; neutral fine sandy loam
Bt—11 to 39 inches; neutral fine sandy loam and sandy clay loam
2Btk—39 to 80 inches; slightly alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.0 inches (High)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site name: Sandy Loam 20-25" PZ
Ecological site number: R083CY480Texas
Typical vegetation: Native woody species include mesquite and huisache. Native grass species include silver bluestem, hooded windmillgrass, Arizona cottontop, tanglehead, plains bristlegrass, trichloris, and pappusgrass.

Use and Management

The major land uses for this soil are livestock grazing, forage production, wildlife habitat, and crop production. Some of the crops grown are grain sorghum, cotton, and corn.

CoC—Comitas loamy fine sand, 0 to 5 percent slopes

Setting

Major land resource area: MLRA 83E—Sandsheet Prairie
Elevation: 245 to 750 feet
Mean annual precipitation: 22 to 25 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 280 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Comitas and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Comitas
Landscape: Coastal plains
Landforms: Vegetated sandsheets
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian sands of Holocene age over eolian deposits and/or alluvium of Quaternary age

Typical Profile

A—0 to 31 inches; neutral loamy fine sand
Bt—31 to 59 inches; neutral fine sandy loam
Btk—59 to 80 inches; moderately alkaline fine sandy loam

Properties and Qualities

Slope: 0 to 5 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (Moderately rapid)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 6.7 inches (Moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site name: Loamy Sand 25-35" PZ
Ecological site number: R083EY705Texas
Typical vegetation: Native woody species include live oak and mesquite. Native grass species include pinhole bluestem, little bluestem, plains bristlegrass, Arizona cottontop, tanglehead, sideoats grama, seacoast bluestem, onesided crinkleawn, hooded windmillgrass, and brownseed paspalum.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

CpC—Copita sandy clay loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 545 to 875 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Copita and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Copita
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from calcareous sandstone

Typical Profile

A—0 to 11 inches; moderately alkaline sandy clay loam
Bk—11 to 37 inches; moderately alkaline sandy clay loam
Crk—37 to 49 inches; moderately alkaline, weakly cemented sandstone bedrock
R—49 to 54 inches; strongly cemented sandstone bedrock

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: Paralithic bedrock at 20 to 40 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 2.7 inches (Very low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site name: Gray Sandy Loam 18-25" PZ
Ecological site number: R083BY421Texas
Typical vegetation: Native woody species include mesquite, spiny hackberry, guayacan, condalia, blackbrush, ceniza, and guajillo. Native grass species include trichloris, Arizona cottontop, plains bristlegrass, lovegrass tridens, hooded windmillgrass, and pink pappusgrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

CyB—Coy clay loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 295 to 605 feet
Mean annual precipitation: 22 to 29 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 275 to 295 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Coy and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Coy
Landscape: Inland, dissected coastal plains
Landforms: Interfluves, drainageways
Geomorphic positions, two-dimensional: Footslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous clayey alluvium derived from shale

Typical Profile

A—0 to 6 inches; moderately alkaline clay loam
Bt1—6 to 12 inches; moderately alkaline clay loam
Bt2—12 to 40 inches; moderately alkaline clay
Bk and Bky—40 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.5 inches (High)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: 2e
Ecological site name: Clay Loam 20-25" PZ
Ecological site number: R083CY446Texas
Typical vegetation: Native woody species include whitebrush and mesquite. Native grass species include Texas cupgrass, pinhole bluestem, plains lovegrass, sideoats grama, buffalograss, plains bristlegrass, vine-mesquite, Texas wintergrass, curly-mesquite, and false Rhodesgrass.

Use and Management

The major land uses of this soil are for livestock grazing, wildlife habitat, and forage production. Some areas are used for crop production. Some of the crops grown are grain sorghum.

CZA—Czar-Clareville soils, 0 to 1 percent slopes, rarely flooded

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 295 to 695 feet

Mean annual precipitation: 22 to 29 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 250 to 300 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Czar and similar soils: 60 percent
Clareville and similar soils: 35 percent
Contrasting soils: 5 percent

Soil Description

Czar

Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy alluvium of quaternary age

Typical Profile

A—0 to 7 inches; moderately acid fine sandy loam
Bt—7 to 61 inches; neutral and slightly alkaline sandy clay loam
2Btk—61 to 80 inches; strongly alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.2 inches (High)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Rare
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2c
Ecological site name: Loamy Bottomland 20-35" PZ
Ecological site number: R083CY462Texas
Typical vegetation: Native woody species include mesquite, whitebrush, spiny hackberry, sugar hackberry, pricklypear, and huisache. Native grass species include fourflower trichloris, Arizona cottontop, sideoats grama, plains bristlegrass, hooded windmillgrass, and prairie threeawn.

Clareville

Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Clayey alluvium of Quaternary age

Typical Profile

Ap—0 to 5 inches; neutral loam
A—5 to 11 inches; neutral clay loam
Bt—11 to 25 inches; slightly alkaline clay loam
Btk—25 to 33 inches; moderately alkaline clay loam
Bk—33 to 46 inches; moderately alkaline clay loam
BCk—46 to 80 inches; moderately alkaline loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (Moderately slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.4 inches (High)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Rare
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2c
Ecological site name: Clay Loam 25-35" PZ
Ecological site number: R083AY629Texas
Typical vegetation: Native woody species include mesquite, whitebrush, and spiny hackberry. Native grass species include Arizona cottontop, little bluestem, sideoats grama, curly-mesquite, and Texas bristlegrass.

Use and Management

The major land uses for this soil are crop production, forage production, livestock grazing, and wildlife habitat. Some of the crops grown are grain sorghum, corn, and cotton.

DaB—Delfina loamy fine sand, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83E—Sandsheet Prairie
Elevation: 245 to 340 feet
Mean annual precipitation: 24 to 28 inches
Mean annual air temperature: 72 to 74 degrees F
Frost-free period: 290 to 340 days
Map unit prime farmland class: Not prime farmland

Composition

Delfina and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Delfina
Landscape: Coastal plains
Landforms: Vegetated sandsheets

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian sands over eolian deposits and/or alluvium

Typical Profile

A—0 to 15 inches; neutral loamy fine sand
Bt—15 to 33 inches; slightly alkaline sandy clay loam
2Btk—33 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.4 inches (Moderate)
Natural drainage class: Moderately well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability irrigated: 3e
Land capability nonirrigated: 2e
Ecological site name: Loamy Sand 25-35" PZ
Ecological site number: R083EY705Texas
Typical vegetation: Little bluestem, Arizona cottontop, plains bristlegrass, tanglehead, sideoats grama, hooded windmillgrass, pink pappusgrass, fringeleaf paspalum, and other annual forbs and grasses

Use and Management

The major land uses for this soil are wildlife habitat, livestock grazing, and crop or forage production.

DeA—Delfina fine sandy loam, 0 to 2 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 340 feet
Mean annual precipitation: 24 to 28 inches
Mean annual air temperature: 72 to 74 degrees F
Frost-free period: 290 to 340 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Delfina and similar soils: 95 percent
Contrasting soils: 5 percent

Soil Description

Delfina
Landscape: Coastal plains
Landforms: Paleoterraces

Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian sands over eolian deposits and/or alluvium

Typical Profile

A—0 to 16 inches; slightly acid and neutral fine sandy loam
2Bt—16 to 34 inches; neutral and moderately alkaline sandy clay loam
2Btk—34 to 80 inches; moderately alkaline and strongly alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 2 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.4 inches (Moderate)
Natural drainage class: Moderately well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability irrigated: 2e
Land capability nonirrigated: 2e
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083EY702Texas
Typical vegetation: Fourflower trichloris, hooded windmillgrass, pink pappusgrass, buffalograss, sideoats grama, tanglehead, plains bristlegrass, plains lovegrass, Arizona cottontop, fringeleaf paspalum, and other annual forbs and grasses

Use and Management

The major land uses for this soil are crop production, livestock grazing, forage production, and wildlife habitat.

DfB—Delmita loamy fine sand, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83E—Sandsheet Prairie
Elevation: 245 to 750 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 340 to 360 days
Map unit prime farmland class: Not prime farmland

Composition

Delmita and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Delmita
Landscape: Inland, dissected coastal plains

Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Thin eolian sands over noncalcareous loamy alluvium over petrocalcic derived from calcareous loamy alluvium

Typical Profile

A—0 to 14 inches; neutral loamy fine sand
Bt—14 to 30 inches; neutral sandy clay loam
Bkkm—30 to 80 inches; cemented material

Properties and Qualities

Slope: 0 to 3 percent
Percent of area covered by surface fragments: About 1 percent nonflat gravels
Depth to first restrictive layer: Petrocalcic layer at 20 to 40 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 2.7 inches (Very low)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Loamy Sand 25-35" PZ
Ecological site number: R083EY705Texas
Typical vegetation: Native woody species includes mesquite, catclaw, lime pricklyash, desert yaupon, and pricklypear. Native grass species include Arizona cottontop, lovegrass tridens, plains bristlegrass, and pink pappusgrass.

Use and Management

The major land uses for this soil are livestock grazing, forage production, wildlife habitat, and crop production. Some of the crops grown are grain sorghum, cotton, and corn.

DmB—Delmita fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 750 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 280 to 340 days
Map unit prime farmland class: Not prime farmland

Composition

Delmita and similar soils: 90 percent

Contrasting soils: 10 percent

Soil Description

Delmita
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Noncalcareous loamy alluvium over petrocalcic derived from calcareous loamy alluvium

Typical Profile

A—0 to 14 inches; neutral fine sandy loam
Bt—14 to 30 inches; neutral sandy clay loam
Bkkm—30 to 80 inches; cemented material

Properties and Qualities

Slope: 0 to 3 percent
Percent of area covered by surface fragments: About 3 percent nonflat gravels
Depth to first restrictive layer: Petrocalcic at 20 to 40 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 5.3 inches (Low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Red Sandy Loam 20-25" PZ
Ecological site number: R083CY467Texas
Typical vegetation: Native woody species includes mesquite, catclaw, lime pricklyash, desert yaupon, and pricklypear. Native grass species include Arizona cottontop, lovegrass tridens, plains bristlegrass, and pink pappusgrass.

Use and Management

The major uses for this soil are livestock grazing, wildlife habitat, and crop production. Some of the crops grown are grain sorghum, corn, and watermelons.

DRB—Delmita-Randado complex, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 800 feet
Mean annual precipitation: 22 to 29 inches
Mean annual air temperature: 57 to 84 degrees F

Frost-free period: 270 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Delmita and similar soils: 60 percent
Randado and similar soils: 35 percent
Contrasting soils: 5 percent

Soil Description

Delmita
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Noncalcareous loamy alluvium over petrocalcic derived from calcareous loamy alluvium

Typical Profile

A—0 to 11 inches; neutral fine sandy loam
Bt—11 to 28 inches; neutral sandy clay loam
Bkkm1—28 to 58 inches; cemented material
Bkkm2—58 to 80 inches; cemented material

Properties and Qualities

Slope: 0 to 3 percent
Percent of area covered by surface fragments: About 3 percent angular channers
Depth to first restrictive layer: Petrocalcic layer at 20 to 40 inches and 53 to 61 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.7 inches (Low)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Red Sandy Loam 20-25" PZ
Ecological site number: R083CY467Texas
Typical vegetation: Native woody species include mesquite and pricklypear. Native grass species include Arizona cottontop, hooded windmillgrass, tanglehead, pinhole bluestem, plains lovegrass, threeawn, fringeleaf paspalum, and slim tridens.

Randado

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Linear

Across-slope shape: Convex
Parent material: Loamy alluvium, noncalcareous loamy alluvium over petrocalcic derived from calcareous loamy alluvium

Typical Profile

A—0 to 8 inches; slightly acid fine sandy loam
Bt—8 to 16 inches; neutral fine sandy loam
Bkkm1—16 to 20 inches; cemented material
Bkkm2—20 to 80 inches; cemented material

Properties and Qualities

Slope: 0 to 3 percent
Percent of area covered by surface fragments: About 5 percent angular channers
Depth to first restrictive layer: Petrocalcic layer at 16 to 20 inches and 20 to 80 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.9 inches (Very low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 6s
Land capability irrigated: 4e
Ecological site name: Shallow Sandy Loam 20-30" PZ
Ecological site number: R083CY487Texas
Typical vegetation: Native woody species include mesquite and pricklypear. Native grass species include Arizona cottontop, hooded windmillgrass, tanglehead, pink pappusgrass, silver bluestem, fall witchgrass, slim tridens, sand dropseed, and bristlegrass.

Use and Management

The major land uses for this soil are livestock production and wildlife habitat.

GeB—Gertrudis fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 245 to 505 feet
Mean annual precipitation: 24 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 290 to 320 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Gertrudis and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Gertrudis
Landscape: Coastal plains
Landforms: Stream terraces
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Loamy eolian deposits over calcareous loamy alluvium of Quaternary age

Typical Profile

A—0 to 17 inches; moderately alkaline fine sandy loam and very fine sandy loam
Bk—17 to 41 inches; moderately alkaline sandy clay loam
2Bk—41 to 80 inches; moderately alkaline clay loam and loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.9 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2e
Land capability irrigated: 2e
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083AY388Texas
Typical vegetation: Fourflower trichloris, lovegrass tridens, green sprangletop, plains bristlegrass, hooded windmillgrass, pink pappusgrass, slim tridens, buffalograss, Arizona cottontop, plains lovegrass, whitebrush, lime pricklyash, and other perennial forbs

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat. Other small areas are used for crop or forage production.

GRD—Grava soils, 1 to 8 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 400 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 250 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Grava and similar soils: 85 percent
Contrasting soils: 15 percent

Soil Description

Grava
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Residuum derived from gravelly alluvium

Typical Profile

A—0 to 5 inches; neutral very gravelly sandy clay loam
Bt—5 to 27 inches; neutral extremely gravelly clay
Bk—27 to 30 inches; moderately alkaline very gravelly clay loam
Bkkm1—30 to 39 inches; cemented material
Bkkm2—39 to 80 inches; cemented material

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: About 75 percent subrounded gravel
Depth to first restrictive layer: Petrocalcic at 20 to 40 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (Moderately slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 2.4 inches (Very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 7s
Ecological site name: Gravelly Ridge 20-35" PZ
Ecological site number: R083CY454Texas
Typical vegetation: Native woody species includes blackbrush, mountain laurel, mesquite, hog plum, ceniza, guayacan, pricklypear, coyotillo, amargosa and catclaw. Native grass species include sideoats grama, buffalograss, perennial threeawn, Arizona cottontop, tanglehead, plains bristlegrass, and hooded windmillgrass.

Use and Management

The major land uses for this soil are wildlife habitat and livestock grazing.

HeB—Hebbronville fine sandy loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83E—Sandsheet Prairie
Elevation: 245 to 620 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 310 days
Map unit prime farmland class: Not prime farmland

Composition

Hebbronville and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Hebbronville
Landscape: Inland, dissected coastal plains
Landforms: Vegetated sandsheets
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Eolian sands over calcareous loamy alluvium

Typical Profile

A—0 to 5 inches; neutral fine sandy loam
Bt—5 to 21 inches; slightly alkaline fine sandy loam
Btk—21 to 51 inches; moderately alkaline fine sandy loam
Bk—51 to 65 inches; moderately alkaline fine sandy loam
BC—65 to 80 inches; moderately alkaline fine sandy loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 2.0 to 6.0 in/hr (Moderately rapid)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.2 inches (Moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083EY702Texas
Typical vegetation: Native woody species include mesquite, blackbrush, and pricklypear. Native grass species include Arizona cottontop, false Rhodesgrass, lovegrass tridens, pink pappusgrass, plains bristlegrass, plains lovegrass, tanglehead, and whiplash pappusgrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

HoB—Houla clay loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 300 to 700 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 260 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Houla and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Houla
Landscape: Inland, dissected coastal plains
Landforms: Broad flats, erosion remnants
Geomorphic positions, two-dimensional: Footslope
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Residuum from calcareous, tuffaceous sandstone

Typical Profile

A1—0 to 7 inches; moderately alkaline clay loam
A2—7 to 16 inches; moderately alkaline silty clay
Bk1—16 to 32 inches; moderately alkaline silty clay loam
Bk2—32 to 51 inches; slightly alkaline loam
Bk3—51 to 80 inches; moderately alkaline silt loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.4 inches (High)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3s
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456Texas
Typical vegetation: Native woody species include mesquite, condalia, palo verde, desert yaupon, and Texas kidneywood. Native grass species include plains bristlegrass, hooded windmillgrass, pink pappusgrass, Arizona cottontop, trichloris, lovegrass tridens, tanglehead, vine-mesquite, and buffalograss. Native species of forbs include bundleflower, bushsunflower, orange zexmenia, and gaura.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for forage production.

JdB—Jardin fine sandy loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 685 feet
Mean annual precipitation: 22 to 27 inches

Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 250 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Jardin and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Jardin
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian sands mixed with calcareous, loamy residuum of the Goliad Formation

Typical Profile

A1—0 to 9 inches; moderately alkaline fine sandy loam
A2—9 to 17 inches; moderately alkaline fine sandy loam
Bkkm1—17 to 22 inches; cemented material
Bkkm2—22 to 80 inches; cemented material

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: About 5 percent angular channers
Depth to first restrictive layer: Petrocalcic layer at 17 to 22 inches and 22 to 80 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.2 inches (Very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 6s
Ecological site name: Shallow Sandy Loam 20-30" PZ
Ecological site number: R083CY487Texas
Typical vegetation: Native woody species include guajillo, spiny hackberry, blackbrush, condalia, vine ephedra, desert yaupon, shrubby blue sage, Texas kidneywood, southwest bernardia, and leatherstem. Native grass species include Arizona cottontop, plains bristlegrass, slim tridens, tanglehead, pink pappusgrass, fall witchgrass, hooded windmillgrass, and feather bluestem.

Use and Management

The major land uses of this soil are wildlife habitat and livestock grazing.

LoC—Lomart loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 695 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Lomart and similar soils: 85 percent
Contrasting soils: 15 percent

Soil Description

Lomart
Landscape: Inland, dissected coastal plains
Landforms: Erosion remnants
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Residuum from noncalcareous tuffaceous sandstone

Typical Profile

A—0 to 6 inches; moderately alkaline loam
Bk1—6 to 10 inches; moderately alkaline paragravelly silt loam
Bk2—10 to 38 inches; moderately alkaline extremely paracobbly silt loam
Cr—38 to 80 inches; bedrock

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: Paralithic bedrock at 20 to 40 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.7 inches (Low)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site name: Shallow Sandy Loam 20-30" PZ
Ecological site number: R083CY487Texas
Typical vegetation: Native woody species include guajillo, guayacan, ceniza, palo verde, desert yaupon, and mesquite. Native grass species include sideoats grama, feathery bluestem, plains bristlegrass, green sprangletop, Arizona cottontop, and slim tridens.

Use and Management

The major land uses for this soil are wildlife habitat and livestock grazing.

McB—Maverick clay, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 295 to 445 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 275 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Maverick and similar soils: 80 percent
Contrasting soils: 20 percent

Soil Description

Maverick
Landscape: Inland, dissected coastal plains
Landforms: Interfluves, ridges
Geomorphic positions, two-dimensional: Backslope, footslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum derived from tertiary shale

Typical Profile

A—0 to 5 inches; moderately alkaline clay
Bkz—5 to 21 inches; moderately alkaline clay
Bkyz—21 to 26 inches; moderately alkaline clay
Cdkyz—26 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: Densic bedrock at 20 to 40 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Saline
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.4 inches (Low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site name: Rolling Hardland 18-25" PZ
Ecological site number: R083BY431Texas

Typical vegetation: Native woody species include mesquite, agarito, pricklypear cactus, and Texas varilla. Native grass species include alkali sacaton, sideoats grama, plains bristlegrass, twoflower trichloris, tobosagrass, vine-mesquite, pinhole bluestem, and buffalograss.

Use and Management

The major land uses of this soil are livestock grazing and wildlife habitat.

MgD—Mirasol very gravelly sandy loam, 1 to 8 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 750 feet
Mean annual precipitation: 23 to 25 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 280 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Mirasol and similar soils: 85 percent
Contrasting soils: 15 percent

Soil Description

Mirasol
Landscape: Inland, dissected coastal plains
Landforms: Cuestas, scarp slopes
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from tuff

Typical Profile

A—0 to 6 inches; moderately alkaline very gravelly sandy loam
Bw—6 to 16 inches; moderately alkaline very gravelly sandy loam
Bkqm—16 to 19 inches; strongly cemented material
Bqm—19 to 80 inches; strongly cemented material

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: About 25 percent subrounded gravels, cobbles, and stones
Depth to first restrictive layer: Duripan at 8 to 19 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.7 inches (Very low)
Natural drainage class: Well drained
Runoff: Very high
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 7s
Ecological site name: Shallow Ridge 20-25" PZ
Ecological site number: R083CY485Texas
Typical vegetation: Native woody species include blackbrush, mountain laurel, guayacan, coyotillo, pricklypear, and mesquite. Native grass species include bluestem, plains bristlegrass, hooded windmillgrass, Arizona windmillgrass, tanglehead, fall witchgrass, slim tridens, pink pappusgrass, and sand dropseed.

Use and Management

The major land uses for this soil are wildlife habitat and livestock grazing.

MoC—Moglia clay loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 245 to 800 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 260 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Moglia and similar soils: 85 percent
Contrasting soils: 15 percent

Soil Description

Moglia
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous, saline loamy residuum weathered from shale

Typical Profile

A—0 to 7 inches; moderately alkaline clay loam
Bkz—7 to 21 inches; moderately alkaline clay loam
Bknz—21 to 30 inches; moderately alkaline clay loam
2Bknz—30 to 42 inches; moderately alkaline loam
2Bknyz—42 to 54 inches; moderately alkaline loam
3Bknyz—54 to 80 inches; moderately alkaline clay loam

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (Moderately slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 5.9 inches (Low)
Natural drainage class: Well drained
Runoff: Low

Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site name: Saline Clay Loam 18-35" PZ
Ecological site number: R083BY433Texas
Typical vegetation: Native woody species include blackbrush, lotebush, mesquite, and pricklypear. Native grass species include red grama, Hall's panicum, threeawn, and Texas bristlegrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

MwA—Monwebb clay, 0 to 1 percent slopes, occasionally flooded

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 400 to 980 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 270 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Monwebb and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Monwebb
Landscape: Inland, dissected coastal plains
Landforms: Valley flats
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Clayey alluvium

Typical Profile

A—0 to 5 inches; moderately alkaline clay
An—5 to 11 inches; moderately alkaline clay
Bnss—11 to 28 inches; slightly alkaline clay
Bnssz—28 to 39 inches; slightly alkaline clay
Bknssz—39 to 46 inches; slightly alkaline clay
Bknz—46 to 80 inches; slightly alkaline clay and moderately alkaline clay loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic

Representative total available water capacity to 60 inches: About 9.1 inches (High)
Natural drainage class: Moderately well drained
Runoff: Negligible
Flooding frequency: Occasional
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 4s
Ecological site name: Clay Flat 18-25" PZ
Ecological site number: R083BY415Texas
Typical vegetation: Native woody species include mesquite, guajillo, blackbrush, pricklypear, and leatherstem. Native grass species include pink pappusgrass, buffalograss, curly-mesquite, whiplash pappusgrass, plains bristlegrass, sideoats grama, Texas wintergrass, vine-mesquite, tobosagrass, alkali sacaton, white tridens, and trichloris.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

NfC—Nueces fine sand, 0 to 5 percent slopes

Setting

Major land resource area: MLRA 83E—Sandsheet Prairie
Elevation: 245 to 495 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Nueces and similar soils: 80 percent
Contrasting soils: 20 percent

Soil Description

Nueces
Landscape: Coastal plains
Landforms: Vegetated sandsheets
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian sands of Holocene age over eolian deposits and/or alluvium of Quaternary age

Typical Profile

A—0 to 10 inches; slightly alkaline fine sand
E—10 to 31 inches; strongly acid fine sand
2Bt—31 to 80 inches; neutral and moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 5 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (Moderately slow)
Salinity, maximum within 40 inches: Not saline

Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.5 inches (Moderate)
Natural drainage class: Moderately well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 4e
Ecological site name: Sandy 20-35" PZ
Ecological site number: R083EY706Texas
Typical vegetation: Native woody species include mesquite and live oak. Native grass species include seacoast bluestem, yellow indiangrass, tanglehead, Pan American balsamscale, sand dropseed, and fringeleaf paspalum.

Use and Management

The major land uses for this soil are livestock grazing, forage production, wildlife habitat, and crop production. Some of the crops grown are water melons.

NuC—Nusil loamy fine sand, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 245 to 445 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Nusil and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Nusil
Landscape: River valleys
Landforms: Stream terraces
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium of Quaternary age overlain by eolian sands of Holocene age

Typical Profile

A—0 to 15 inches; slightly acid loamy fine sand
E—15 to 28 inches; slightly acid loamy fine sand
Bt—28 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Slow)

Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.0 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site name: Sandy 20-35" PZ
Ecological site number: R083AY406Texas
Typical vegetation: Native woody species include mesquite, live oak, pricklypear, and catclaw acacia. Native grass species include little bluestem, brownseed paspalum, Indiangrass, switchgrass, tanglehead, fringeleaf paspalum, and hooded windmillgrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat. A few areas are used for forage production.

OmD—Olmedo very gravelly sandy loam, 1 to 8 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 295 to 1,200 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 250 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Olmedo and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Olmedo
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy residuum of Miocene-Pliocene age

Typical Profile

A1—0 to 8 inches; moderately alkaline very gravelly sandy loam
A2—8 to 18 inches; moderately alkaline extremely gravelly sandy clay loam
Bkkm1—18 to 30 inches; cemented material
BCkk—30 to 51 inches; strongly alkaline silt loam
BCk—51 to 80 inches; moderately alkaline paragravelly silt loam

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: About 13 percent subangular medium and coarse gravel, about 2 percent angular channers
Depth to first restrictive layer: Petrocalcic layer at 10 to 20 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.4 inches (Very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 7s
Ecological site name: Shallow Ridge 20-25" PZ
Ecological site number: R083CY485Texas
Typical vegetation: Native woody species include ceniza, guajillo, elbowbush, mescal bean, vine ephedra, and Texas kidneywood. Native grass species include Arizona cottontop, pinhole bluestem, plains bristlegrass, and sideoats grama.

Use and Management

The major land uses for this soil are wildlife habitat and livestock grazing (fig. 8).

Figure 8.—Soils that have a petrocalcic within 40 inches of the soil surface often support dense communities of brush. This picture is of the Olmedo series, and some of the brush species include ceniza, **mesquite, agarita, and guajillo.**

PgA—Papagua fine sandy loam, 0 to 1 percent slopes

Setting

Major land resource area: MLRA 83E—Sandsheet Prairie
Elevation: 245 to 520 feet
Mean annual precipitation: 23 to 28 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Papagua and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Papagua
Landscape: Coastal plains
Landforms: Closed depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Eolian sands over loamy alluvium on the Sandsheet Prairie

Typical Profile

A—0 to 12 inches; neutral fine sandy loam
Btg—12 to 41 inches; neutral sandy clay
Btkg and Btk—41 to 70 inches; slightly alkaline and moderately alkaline sandy clay loam
BCk—70 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.1 inches (High)
Natural drainage class: Moderately well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional

Interpretive Groups

Land capability nonirrigated: 3w
Ecological site name: Lakebed 20-35" PZ
Ecological site number: R083EY721Texas
Typical vegetation: Native woody species include mesquite and huisache. Native grass species include Arizona cottontop, cane bluestem, pink pappusgrass, hooded windmillgrass, sideoats grama, vine-mesquite, buffalograss, big cenchrus, curly-mesquite, lovegrass tridens, trichloris, and bristlegrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

PmC—Pernitas fine sandy loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 800 feet
Mean annual precipitation: 23 to 27 inches
Mean annual air temperature: 70 to 75 degrees F
Frost-free period: 275 to 295 days
Map unit prime farmland class: Not prime farmland

Composition

Pernitas and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Pernitas
Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium in the Oakville Sandstone and Fleming Formation of Miocene age or (to a lesser extent) in the Goliad Formation of Miocene-Pliocene age

Typical Profile

A—0 to 7 inches; moderately alkaline fine sandy loam
Bt—7 to 35 inches; moderately alkaline sandy clay loam
Bk1—35 to 58 inches; moderately alkaline clay loam
Bk2—58 to 80 inches; moderately alkaline loam

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.7 inches (Moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456Texas
Typical vegetation: Native woody species include mesquite, catclaw, spiny hackberry, and blackbrush. Native grass species include pink pappusgrass, lovegrass tridens, fall witchgrass, hooded windmillgrass, and plains bristlegrass.

Use and Management

The major land uses for this soil are livestock grazing, wildlife habitat, and forage production.

PnB—Pernitas sandy clay loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 800 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 70 to 75 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Pernitas and similar soils: 85 percent
Contrasting soils: 15 percent

Soil Description

Pernitas
Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy alluvium in the Oakville Sandstone and Fleming Formation of Miocene age or (to a lesser extent) in the Goliad Formation of Miocene-Pliocene age

Typical Profile

A—0 to 12 inches; moderately alkaline sandy clay loam
Bt—12 to 30 inches; moderately alkaline clay loam
Btk—30 to 52 inches; moderately alkaline sandy clay loam
Bk—52 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.1 inches (High)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site name: Gray Sandy Loam 20-25" PZ
Ecological site number: R083CY456Texas
Typical vegetation: Native woody species include mesquite, catclaw, spiny hackberry, and blackbrush. Native grass species include pink pappusgrass, lovegrass tridens, fall witchgrass, hooded windmillgrass, and plains bristlegrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

PRC—Piedras and Cuevitas soils, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 800 feet
Mean annual precipitation: 22 to 29 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 330 days
Map unit prime farmland class: Not prime farmland

Composition

Piedras and similar soils: 60 percent
Cuevitas and similar soils: 35 percent
Contrasting soils: 5 percent

Soil Description

Piedras
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Noncalcareous, loamy alluvium over petrocalcic derived from calcareous loamy alluvium of Miocene-Pliocene age

Typical Profile

A—0 to 2 inches; neutral fine sandy loam
A/Bk—2 to 10 inches; slightly alkaline extremely cobbly fine sandy loam
Bkkm1—10 to 13 inches; cemented material
Bkkm2—13 to 80 inches; cemented material

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: About 15 percent angular channers, about 5 percent subangular channers, about 5 percent angular flagstones
Depth to first restrictive layer: Petrocalcic layer at 8 to 26 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 2.0 inches (Very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 6s
Ecological site name: Shallow Sandy Loam 20-25" PZ
Ecological site number: R083CY487Texas

Typical vegetation: Native woody species include mesquite, blackbrush, guajillo, leatherstem, and pricklypear. Native grass species include tanglehead, Arizona cottontop, hooded windmillgrass, silver bluestem, fall witchgrass, plains bristlegrass, sand dropseed, and slim tridens.

Cuevitas

Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Noncalcareous, loamy alluvium over petrocalcic derived from calcareous loamy alluvium of Miocene-Pliocene age

Typical Profile

A1—0 to 1 inch; neutral fine sandy loam
A2—1 to 9 inches; neutral fine sandy loam
Bkkm1—9 to 16 inches; cemented material
Bkkm2—16 to 80 inches; cemented material

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: About 3 percent subangular channers, about 8 percent subangular flagstones
Depth to first restrictive layer: Petrocalcic layer at 6 to 14 inches and 8 to 20 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 0.9 inches (Very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 7s
Ecological site name: Shallow Sandy Loam 20-25" PZ
Ecological site number: R083CY487Texas
Typical vegetation: Native woody species include mesquite, blackbrush, guajillo, leatherstem, ceniza, and pricklypear. Native grass species include Arizona cottontop, fall witchgrass, hooded windmillgrass, plains bristlegrass, silver bluestem, slim tridens, and tanglehead.

Use and Management

The major land uses for this soil are wildlife habitat and livestock grazing.

Ps—Pits, quarry

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 800 feet

Mean annual precipitation: 25 to 28 inches
Mean annual air temperature: 72 to 74 degrees F
Frost-free period: 319 to 341 days
Map unit prime farmland class: Not prime farmland

Composition

Pits quarry and similar soils: 100 percent

Properties and Qualities

Slope: 1 to 40 percent
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Flooding frequency: None
Ponding frequency: Not ponded

PtB—Premont fine sandy loam, 0 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 245 to 340 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 290 to 320 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Premont and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Premont
Landscape: Coastal plains
Landforms: Paleoterraces
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy alluvium over calcareous loamy alluvium of Quaternary age

Typical Profile

A—0 to 8 inches; neutral fine sandy loam
Bt and Btk—8 to 37 inches; slightly alkaline sandy clay loam
2Btk—37 to 60 inches; strongly alkaline sandy clay loam
2Bk—60 to 80 inches; strongly alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.6 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low

Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083AY407Texas
Typical vegetation: False rhodesgrass, Kleberg bluestem, plains bristlegrass, shortspike windmillgrass, and guineagrass with mesquite, pricklypear and other perennial grasses, shrubs, and forbs.

Use and Management

The major land uses for this soil are wildlife habitat, livestock grazing, and crop or forage production (fig. 9).

ReA—Realitos clay, 0 to 1 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 895 feet
Mean annual precipitation: 21 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 250 to 320 days
Map unit prime farmland class: Not prime farmland

Figure 9.—The Premont series is commonly used for crop production in Duval County as seen here. The darker area in the middle of the picture, and the area with the brush is the Realitos series, found in enclosed depressions. Ponding occurs too frequently on Realitos to make cultivation profitable.

Composition

Realitos and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Realitos
Landscape: Inland, dissected coastal plains
Landforms: Closed depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey alluvium

Typical Profile

A—0 to 6 inches; slightly acid clay
Bss—6 to 49 inches; neutral and slightly alkaline clay
Bkss—49 to 80 inches; moderately alkaline clay loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.0 inches (High)
Natural drainage class: Somewhat poorly drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional

Interpretive Groups

Land capability nonirrigated: 4w
Ecological site name: Lakebed 20-35" PZ
Ecological site number: R083CY461Texas
Typical vegetation: Native woody species include mesquite, sugar hackberry, retama, and huisache. Native grass species include spike lovegrass, Hartweg's paspalum, white tridens, switchgrass, knotgrass bristlegrass, buffalograss, and sedge.

Use and Management

The major land uses for this soil are wildlife habitat and livestock grazing.

SaC—Salco sandy clay loam, 1 to 5 percent slopes

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 300 to 720 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 260 to 300 days
Map unit prime farmland class: Not prime farmland

Composition

Salco and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Salco
Landscape: Inland, dissected coastal plains
Landforms: Interfluves
Geomorphic positions, two-dimensional: Backslope, footslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy, calcareous, alluvium and/or tuffaceous residuum of Miocene age

Typical Profile

A—0 to 7 inches; moderately alkaline sandy clay loam
Bt—7 to 26 inches; moderately alkaline sandy clay loam
Btk—26 to 52 inches; moderately alkaline sandy clay loam
Ck—52 to 80 inches; moderately alkaline loam

Properties and Qualities

Slope: 1 to 5 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.2 inches (High)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3s
Ecological site name: Gray Loamy Upland 20-25" PZ
Ecological site number: R083CY455Texas
Typical vegetation: Native woody species include condalia, palo verde, wolfberry, guayacan, Texas permission, desert yaupon, Texas kidneywood, and Bumelia. Native grass species include plains bristlegrass, Arizona cottontop, Nash windmillgrass, hooded windmillgrass, and pink pappusgrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat.

SnC—Sarita fine sand, 0 to 5 percent slopes

Setting

Major land resource area: MLRA 83E—Sandsheet Prairie
Elevation: 245 to 495 feet
Mean annual precipitation: 25 to 27 inches
Mean annual air temperature: 72 to 74 degrees F
Frost-free period: 300 to 341 days

Map unit prime farmland class: Not prime farmland

Composition

Sarita and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Sarita
Landscape: Coastal plains
Landforms: Low vegetated dunes on vegetated sandsheets
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Eolian sands of Holocene age overlying eolian deposits and/or alluvium of Quaternary age

Typical Profile

A—0 to 8 inches; slightly acid fine sand
E—8 to 48 inches; slightly acid fine sand
2Bt1—48 to 52 inches; slightly acid fine sandy loam
2Bt2—52 to 80 inches; neutral and moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 5 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 6.0 to 20 in/hr (Rapid)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 4.2 inches (Low)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: 4e
Ecological site name: Sandy 25-35" PZ
Ecological site number: R083EY706Texas
Typical vegetation: Native grass species include seacoast bluestem, brownseed paspalum, gulfdune paspalum, fringeleaf paspalum, onesided crinkleawn, and other perennial grasses.

Use and Management

The major land uses for this soil are rangeland and wildlife habitat (fig. 10).

StA—Sinton sandy clay loam, 0 to 1 percent slopes, occasionally flooded

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 245 to 495 feet
Mean annual precipitation: 26 to 28 inches

Figure 10.—Southern Duval County is dominated by the Sandsheet Prairie. Two extensive soils on the Sandsheet are Sarita fine sand (foreground) and Nueces fine sand (background). Despite the low water holding capacity of these soils, forb and grass production can be relatively high in wet years.

Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 295 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Sinton and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Sinton
Landscape: River valleys
Landforms: Flood plains
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Loamy alluvium

Typical Profile

A—0 to 34 inches; moderately alkaline sandy clay loam
Bw—34 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.7 inches (High)

Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Occasional
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 2w
Ecological site name: Loamy Bottomland 20-35" PZ
Ecological site number: R083CY462Texas
Typical vegetation: Native woody species include hackberry, live oak, and mesquite.
Native grass species include little bluestem, vine-mesquite, buffalograss, Virginia wildrye, pink pappusgrass, southwestern bristlegrass, plains bristlegrass, white tridens, Texas wintergrass, switchgrass, sideoats grama, and big cenchrus.

Use and Management

The major land uses for this soil are wildlife habitat and livestock grazing. Some areas are used for forage production.

TaA—Tela sandy clay loam, 0 to 1 percent slopes, rarely flooded

Setting

Major land resource area: MLRA 83B—Western Rio Grande Plain
Elevation: 295 to 800 feet
Mean annual precipitation: 22 to 25 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Prime farmland if irrigated

Composition

Tela and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Tela
Landscape: Inland, dissected coastal plains
Landforms: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy alluvium and/or colluvium

Typical Profile

A—0 to 9 inches; slightly alkaline sandy clay loam
Bt and Btk—9 to 32 inches; slightly alkaline and moderately alkaline sandy clay loam
Bk—32 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.9 inches (High)

Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Rare
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3c
Ecological site name: Ramadero 20-25" PZ
Ecological site number: R083CY466Texas
Typical vegetation: Native woody species include mesquite. Native grass species include Arizona cottontop, sideoats grama, pink pappusgrass, vine-mesquite, cane bluestem, buffalograss, lovegrass tridens, big cenchrus, curly-mesquite, trichloris species, bristlegrass species, and windmillgrass.

Use and Management

The major land uses for this soil are livestock production and wildlife habitat. Some areas are used for forage production.

TcA—Tiocano clay, 0 to 1 percent slopes, ponded

Setting

Major land resource area: MLRA 83C—Central Rio Grande Plain
Elevation: 245 to 800 feet
Mean annual precipitation: 22 to 27 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 250 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Tiocano and similar soils: 90 percent
Contrasting soils: 10 percent

Soil Description

Tiocano
Landscape: Inland, dissected coastal plains
Landforms: Closed depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey alluvium

Typical Profile

A—0 to 10 inches; moderately alkaline clay
Bss—10 to 50 inches; moderately alkaline clay
BCk—50 to 80 inches; moderately alkaline clay

Properties and Qualities

Slope: 0 to 1 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.0 inches (High)

Natural drainage class: Somewhat poorly drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional

Interpretive Groups

Land capability nonirrigated: 6w
Ecological site name: Lakebed 20-35" PZ
Ecological site number: R083CY461Texas
Typical vegetation: Native woody species include retama and huisache. Native grass species include spike lovegrass, Hartweg's paspalum, white tridens, knotgrass, bristlegrass, and sedge.

Use and Management

The major uses for this soil are wildlife habitat and livestock grazing.

W—Water

This map unit includes rivers, streams, lakes, and ponds. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered with water year-round.

WaB—Weesatche fine sandy loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 295 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Weesatche and similar soils: 87 percent
Contrasting soils: 13 percent

Soil Description

Weesatche
Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Footslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium in the Oakville Sandstone and Fleming Formation of Miocene age or (to a lesser extent) in the Goliad Formation of Miocene-Pliocene age

Typical Profile

A—0 to 7 inches; slightly alkaline fine sandy loam
Bt—7 to 29 inches; slightly alkaline sandy clay loam
Btk—29 to 40 inches; slightly alkaline sandy clay loam
Bk—40 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.9 inches (Moderate)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083CY481Texas
Typical vegetation: Native woody species include mesquite, sugar hackberry, spiny hackberry, huisache, pricklypear, and whitebrush. Native grass species include multiflowered trichloris, Arizona cottontop, sideoats grama, plains bristlegrass, hooded windmillgrass, prairie threeawn, and plains lovegrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are used for forage production and crop production.

WaC—Weesatche fine sandy loam, 3 to 5 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 295 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Weesatche and similar soils: 87 percent
Contrasting soils: 13 percent

Soil Description

Weesatche
Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Backslope
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Loamy alluvium in the Oakville Sandstone and Fleming Formation of Miocene age or (to a lesser extent) in the Goliad Formation of Miocene-Pliocene age

Typical Profile

A—0 to 6 inches; slightly alkaline fine sandy loam

Bt—6 to 35 inches; moderately alkaline sandy clay loam
Btk—35 to 80 inches; moderately alkaline sandy clay loam

Properties and Qualities

Slope: 3 to 5 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.3 inches (High)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site name: Sandy Loam 25-35" PZ
Ecological site number: R083CY481Texas
Typical vegetation: Native woody species include mesquite, sugar hackberry, spiny hackberry, huisache, pricklypear, and whitebrush. Native grass species include multiflowered trichloris, Arizona cottontop, sideoats grama, plains bristlegrass, hooded windmillgrass, prairie threeawn, and plains lovegrass.

Use and Management

The major land uses for this soil are livestock grazing and wildlife habitat. Some areas are in forage production.

WeB—Weesatche sandy clay loam, 1 to 3 percent slopes

Setting

Major land resource area: MLRA 83A—Northern Rio Grande Plain
Elevation: 245 to 800 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 320 days
Map unit prime farmland class: Not prime farmland

Composition

Weesatche and similar soils: 85 percent
Contrasting soils: 15 percent

Soil Description

Weesatche
Landscape: Inland, dissected coastal plains
Landforms: Paleoterraces
Geomorphic positions, two-dimensional: Footslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium in the Oakville Sandstone and Fleming Formation of Miocene age or (to a lesser extent) in the Goliad Formation of Miocene-Pliocene age

Typical Profile

A—0 to 8 inches; slightly alkaline sandy clay loam
Bt—8 to 30 inches; moderately alkaline sandy clay loam
Bk—30 to 50 inches; moderately alkaline sandy clay loam and loam
BCk—50 to 80 inches; moderately alkaline loam

Properties and Qualities

Slope: 1 to 3 percent
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Salinity, maximum within 40 inches: Not saline
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.7 inches (High)
Natural drainage class: Well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: None

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Clay Loam 25-35" PZ
Ecological site number: R083AY629Texas
Typical vegetation: Native woody species include mesquite, sugar hackberry, spiny hackberry, huisache, pricklypear and whitebrush. Native grass species include multiflowered trichloris, Arizona cottontop, sideoats gram, plains bristlegrass, hooded windmillgrass, prairie threeawn and plains lovegrass.

Use and Management

The major land uses of this soil are livestock grazing and wildlife habitat.

Prime Farmland

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land/or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 5 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 229,728 acres in the survey area or nearly 20 percent of the total acreage meets the soil requirements for prime farmland. Prime farmland is located throughout the survey area. Most of the acreage is used predominantly for rangeland, with some areas used as improved pasture, and cultivated crops.

A trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units that make up the prime farmland in Duval County are listed in Table 5. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in Table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Crops and Pasture

This section prepared by Bruce Henderson, Zone Conservation Agronomist, Corpus Christi, Texas

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed; and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Texas AgriLife Extension Service. According to resource data for Duval County, approximately 31,000 acres in the survey area are used for crops and pasture. Of this total, according to the 2002 Texas Agricultural Statistics, a little over 12,000 acres were used for row crops, mostly grain sorghum averaging about 1,950 pounds per acre; 2,400 acres for watermelons averaging 10 tons per acre—dry and 22 tons per acre—irrigated; approximately 800 acres for potatoes averaging approximately 9 tons per acre and 16,000 acres for annual forage crops, permanent pasture land, and hayland.

The acreage being farmed according to the Texas Agricultural Statistics is decreasing annually. Duval County has approximately 1,148,845 acres and annual crops accounts for only about 1.3 percent of the overall total acreage and, with the exception of watermelons and potatoes, does not have a major impact on the agricultural economy.

Wind erosion is the major management concern on nearly all of the cropland because of the coarse textured surface layer of the soils. Water erosion is an additional concern in some areas where the slope is more than 2 percent. Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Second, soil erosion on farmland results in sediment entering streams and watercourses. Controlling erosion minimizes the pollution of streams and lakes by sediment and improves the quality of water for livestock, fish, wildlife, and other recreational uses.

Residue management practices, such as conservation tillage and seasonal residue management helps to control erosion. Leaving crop residues on the surface helps to protect the soil against surface crusting, reduces wind erosion, the impacts of raindrops, and decreases the runoff rate. It also provides shade for the soil and thus reduces the soil temperature and evaporation rate. Crop residues increases organic matter, improves soil tilth, and minimizes compaction caused by farm machinery. Residues should be protected from overgrazing and/or burning. Using noninversion tillage equipment that leaves crop residue on the surface is very effective in controlling erosion and minimizing compaction. Wind strips also provide protection to watermelons for plant survival and to reduce wind erosion.

Parallel terraces are effective in controlling water erosion because they reduce the length of slopes. They are most practical in areas of deep and moderately deep soils that have a slope of more than 1 percent.

Field crops suited to the soils and climate of Duval County include grain sorghum, com, watermelons, wheat, barley, dry beans, cowpeas, and forage sorghum. Oats, averaging 30 bushels per acre, and forage sorghum are the most commonly grown annual forage crops.

Because raising beef cattle and hunting leases are the main agricultural enterprises, pasture management is also important. The trend for the past several years has been to convert land from other uses to pastureland and hayland. Introduced grasses and annual forages that respond to good management practices are generally planted. They are used mainly in combination with native range to provide year-round grazing. They are also used for supplemental grazing or haying.

Perennial grasses that are well adapted to the county include coastal bermudagrass, kleingrass, Wilman lovegrass, common buffelgrass, and Alamo switchgrass. Annual forage sorghum is also planted regularly.

Good management practices for pasture include fertilization, rotational grazing, weed control, and brush management. Good management practices for hay include applying fertilizer and cutting at the proper height and stage of plant growth to maintain plant vigor.

Irrigation

In 2003, about 1,800 acres of watermelons and most of the 800 acres of potatoes were irrigated in Duval County. The largest irrigated area is in the southeastern portion of the county near the community of Premont in Jim Wells County.

All water used for irrigation is pumped from wells. Because of the sandy surface texture of the soils, sprinkler irrigation systems are used. Yields of irrigated watermelons are twice of those yields of nonirrigated watermelons.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in Table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in Table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or Texas AgriLife Research can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major

reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961).

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of the soils in this survey area is provided in the section Detailed Soil Map Units, and in Table 6.

Rangeland

This section was prepared by Vivian Garcia, Zone Rangeland Management Specialist, Natural Resources Conservation Service, Corpus Christi, Texas.

Rangeland is the land on which the native vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. In areas that have similar climate and topography, the kind and amount of vegetation produced are closely related to the kind of soil. Effective management is based on the relationship of soils,

vegetation, and water. Rangeland or native grassland receives no regular or frequent cultural treatment, such as fertilizer or tillage.

About 983,320 acres or 86 percent of Duval County is rangeland. The rangeland in Duval County is located within the Central Rio Grande Plains Major Land Resource Area (83C) and the Western Rio Grande Plains Major Land Resource Area (83B) of Texas. The soils are generally calcareous to neutral with loamy soils over loamy and clayey subsoils. The original vegetation grew predominantly on open grassland. It consisted of tall, mid, and short grasses interspersed with woody shrubs and some trees. The relatively abundant woody shrubs were suppressed by periodic fires, some of which were started by lightning and others by the Indian inhabitants of the area.

The vegetative community on the rangeland in the county has changed drastically during the last 200 years. The major factors in the change are fluctuating climatic conditions; continuous, heavy grazing by livestock; and the elimination of fire, both prescribed and wild. Woody plants have increased in abundance on much of the rangeland. The more productive grasses and forbs have been grazed out in some areas and replaced by a mixture of short grasses and annual forbs.

Forage production in areas of rangeland occurs primarily during two distinct growth periods. Most of the annual growth occurs in April, May, and June, when spring rains and moderate temperatures are most favorable to the growth of warm-season plants. A secondary growth period usually occurs in September and October, when fall rains and gradually cooling temperatures are common.

Rangeland Productivity and Management

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils, vegetation, and water.

Table 7 shows, for each soil that supports rangeland vegetation, the ecological site and the potential annual production of vegetation in favorable, normal, and unfavorable years. An explanation of the column headings in the table follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are available in the local offices of the Natural Resources Conservation Service or on the internet at http://www.nrcs.usda.gov/technical/efotg/.

Total dry-weight production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Range management requires knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the

present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in the “National Range and Pasture Handbook,” which is available on the internet at http://www.glti.nrcs.usda.gov or in local offices of the Natural Resources Conservation Service.

The objective in range management is to control grazing so that the plants growing on a site remain or improve to about the same in kind and amount as the climax plant community for that site. Such management generally results in the optimum production of vegetation, reduction of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Good production of livestock and forage on rangeland is obtained primarily by managing the time of grazing and limiting the amount of forage removed. The green parts of plants manufacture food for growth and store part of it for use in regrowth and seed production.

A typical growth curve for MLRA's 83A, 83C, and 83C for rangeland in Duval County is as follows:

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	2	3	7	20	30	15	5	10	4	2	1

Approximately 72 percent of the annual forage production occurs in the months April to July responding to spring and early summer rains. A second smaller growth period may occur in the fall if sufficient moisture is available.

A typical growth curve for Duval County for small grains or winter grain is as follows:

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
14	18	21	22	6	0	0	0	0	0	9	14

Approximately 75 percent of the annual grain production occurs in the months January to April responding to winter precipitation.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 8, Table 9, and Table 10 show the soils in the survey area are rated according to their potential for use in rangeland management.

In Table 8, *ranch access roads* ratings apply to rubber tired vehicles, walking, horseback riding, and similar uses that require minimal cutting or filling. The soils are rated based on the properties and qualities that influence trafficability and erodibility. Many soil survey areas in sparsely populated parts of the country have soil surveys of lower intensity. While some general observations may be made, onsite evaluation is required before the final site is selected. Soils that are rated *not limited* have no restrictions for ranch access roads. A *somewhat limited* rating implies that the soil has features that may impede construction and maintenance of ranch access roads. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit the construction or maintenance of ranch access roads.

Soil properties and qualities considered in rating the degree of limitation are those that influence the ease of building access roads and the performance of access roads

after development. Stoniness, wetness, texture of the surface layer, slope, flooding, erodibility, and, in dry regions, dustiness are the main concerns in developing access roads. For good trafficability, the surface of a path or trail should absorb rainfall readily, remain firm under heavy traffic, and not be dusty when dry.

In Table 9, *plastic water pipeline* installation is installed using narrow, shallow trenches at a maximum depth of 2 feet. The excavations are most commonly made by trenching machines or plows. Soil properties influence the development of construction sites, including the selection of the site, the design of the structure, construction, performance, and after construction maintenance. The soil interpretations for livestock watering pipelines are used as a tool in evaluating soil suitability and identifying soil limitations for the practice. The rating is for soils in their present condition and does not consider present land use. Soils that are rated *not limited* have no restrictions for pipeline installation. A *somewhat limited* rating implies that the soil has features that may impede pipeline installation. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit pipeline installation.

Ratings are based on the soil properties that influence ease of digging and resistance to sloughing. Depth to bedrock or cemented pan, hardness of bedrock or a cemented pan, and the amount of large stones influence the ease of digging, filling, and compacting. Depth to the seasonal high water table and flooding may restrict the period when pipeline can be installed. Slope influences the ease of using machinery. Soil texture and depth to water table influence the resistance to sloughing.

Fencing is the construction and maintenance of barriers for the management of animals and people. Fences are constructed using metal or wooden posts. This interpretation was developed for conditions where the posts are set to a depth of 2 feet or less into the soil with strands of wire suspended between the posts. This interpretation is used to rate the ease of setting posts, maintaining the wire tension, and estimating the replacement and maintenance cost. Excavations for wooden posts are made by power auger or hand dug, metal posts are driven into the soil.

Fencing, Post Depth (less than 24 inches) interpretation is of a general nature and identifies soil features that may restrict the installation of fence posts to a depth of 24 inches. It is designed to be used in the planning process to identify areas of concern prior to installing fencing. Soil features that may impede digging, setting, and maintenance of fencing are identified and guide the user in fence design, construction, and maintenance considerations. Soils that are rated *not limited* have no restrictions for setting fence posts within a depth of 24 inches. A *somewhat limited* rating implies that the soil has features within a depth of 24 inches that may impede digging or setting fence posts or fence maintenance. A *very limited* rating indicates that the soil characteristics within a depth of 24 inches are such that they limit fence post digging or setting or fence maintenance.

Bedrock, cemented pan, and large and small stones influence the excavation of post holes and the driving of posts. Flooding and depth to a seasonal high water table may restrict the season of construction. Flooding also affects maintenance and replacement cost. High water tables raise the maintenance cost and require deeper post settings. High shrink-swell soils require deep post settings or rock jacks to maintain vertical post alignment. Post alignment and maintaining the desired wire tension are often difficult on sandy soils because of their low strength. Soil blowing causes maintenance problems. Frost action results in frost-heaving of the posts. Steep slopes affect the use power augers and the delivery of supplies. During the wet seasons, surface creep on steep slopes may increase maintenance cost. Soil reaction and salinity affect the type of post selected and maintenance costs.

Fencing, Post Depth (less than 36 inches) interpretation is of a general nature and identifies soil features that may restrict the installation of fence posts to a depth of 36 inches. It is designed to be used in the planning process to identify areas of concern prior to installing fencing. Soil features that may impede digging, setting, and maintenance of fencing are identified and guide the user in fence design, construction, and maintenance

considerations. Soils that are rated *not limited* have no restrictions for setting fence posts within a depth of 24 inches. A *somewhat limited* rating implies that the soil has features within a depth of 36 inches that may impede digging or setting fence posts or fence maintenance. A *very limited* rating indicates that the soil characteristics within a depth of 36 inches are such that they limit fence post digging or setting or fence maintenance.

Bedrock, cemented pan, and large and small stones influence the excavation of post holes and the driving of posts. Flooding and depth to a seasonal high water table may restrict the season of construction. Flooding also affects maintenance and replacement cost. High water tables raise the maintenance cost and require deeper post settings. High shrink-swell soils require deep post settings or rock jacks to maintain vertical post alignment. Post alignment and maintaining the desired wire tension are often difficult on sandy soils because of their low strength. Soil blowing causes maintenance problems. Frost action results in frost-heaving of the posts. Steep slopes affect the use of power augers and the delivery of supplies. During the wet seasons surface creep on steep slopes increases maintenance costs. Soil reaction and salinity affect the type of post selected and maintenance costs.

Rangeland roller chopping is commonly practiced, sometimes in combination with seeding, for rangeland restoration. Table 10 shows the overall interpretive rating assigned is the maximum degree of limitation of each soil interpretive property that comprises the interpretive rule. Lesser restrictive soil features are those that have a degree of limitation less then the maximum and are identified to provide the user with additional information about the soil's capability to support the interpretation. These lesser restrictive features could be important factors where the major restrictive features are overcome through practice design and application modifications.

Soils are placed into interpretive rating classes per their degree of limitation. These are not limited (degree of limitation = 0), somewhat limited (degree of limitation > 0 and < 1.0), or very limited (degree of limitation = 1.0). Soils that are rated *not limited* have no restrictions for roller chopping. A *somewhat limited* rating implies that the soil has features that may impede roller chopping. A *very limited* rating indicates that the soil characteristics are such that they limit or prohibit roller chopping.

Steep slopes increase the power requirements for the equipment and limit the ability to safely perform the roller chopping operation. Stones and rock outcrop damage the blades of the roller chopper and make towing more difficult.

Ecological Sites

The following section describes each ecological site in Duval County. The potential plant community is described as well as the site's response to heavy, continuous grazing. For additional detail on the soils in each ecological site, refer to the section on detailed soil map units. Information on rangeland forage yields for each soil can be found in Table 7.

Duval County is composed of three Major Land Resource Areas; MLRA 83B—Western Rio Grande Plain; MLRA 83C—Central Rio Grande Plain; and MLRA 83E—Sandsheet Prairie. MLRA 83A—Northern Rio Grande Plain is not mapped in the county, but some of the soils mapped in the county are assigned to ecological sites in MLRA 83A. A total of 19 ecological sites occur in the county, each being assigned to a particular MLRA. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in the local offices of the Natural Resource Conservation Service.

MLRA 83A—Northern Rio Grande Plain

Clay Loam Ecological Site

This group includes soil mapping units: the Clareville part of CZA—Czar-Clareville soils, 0 to 1 percent, rarely flooded, CyB—Coy clay loam, 1 to 3 percent slopes, and WeB—Weesatche sandy clay loam, 1 to 3 percent slope.

The historic climax plant community on this site is that of open grassland with some scattered mesquite trees and woody shrubs. The brush canopy has been kept at a low level by periodic widespread range fires. The composition by weight is 90 percent grasses, 5 percent forbs, and 5 percent woody plants. This site is found in both MLRA 83A and MLRA 83C. Production is higher in MLRA 83A because of the higher rainfall amount received.

The dominant plants consist of 40 percent plains lovegrass, twoflower and fourflower trichloris, Arizona cottontop, pinhole bluestem, and plains bristlegrass; 20 percent buffalograss, curly-mesquite, and hooded windmillgrass; 15 percent pink pappusgrass; 15 percent Texas wintergrass, lovegrass tridens, white tridens, and perennial threeawn; 5 percent forbs such as bushsunflower, orange zexmenia, and bundleflower; and 5 percent woody plants, such as mesquite, condalia, spiny hackberry, guayacan, and pricklypear.

As the range condition deteriorates from heavy and continuous grazing, twoflower and fourflower trichloris, Arizona cottontop, lovegrass tridens, plains bristlegrass, and many palatable perennial forbs are the first plants to be grazed out. They are replaced by woody plants such as mesquite, blackbrush, whitebrush, and by grasses such as curly-mesquite. If overgrazing continues, the site is dominated by a wide array of woody plants and by an understory of short grasses such as red grama, perennial threeawn, curly-mesquite, and Hall's panicum.

Sandy Ecological Site

This group includes soil mapping units: NuC—Nusil loamy fine sand, 1 to 5 percent slopes.

These soils are deep. They absorb rainfall readily and have a medium available water capacity.

The historic climax plant community on this site is open grassland that supports only occasional motts of brush. Periodic range fires have been a major factor in keeping this site open. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants.

About 55 percent of the climax plant community is seacoast bluestem. About 10 percent is crinkleawn; 5 percent is tanglehead; 5 percent is brownseed paspalum; 5 percent is thin paspalum; 5 percent is balsamscale, sand dropseed, and perennial threeawn; 5 percent is fall witchgrass; and 5 percent is hooded windmillgrass and knotroot bristlegrass. Perennial and annual forbs make up about 5 percent of the climax vegetation. They include snoutbean, western indigo, sensitive-briar, dalea, neptunia, partridge pea, croton, snakecotton, cardinal feather, and horsemint.

Shrubs and trees such as mesquite, catclaw, lantana, brasil, and pricklypear compose an insignificant amount of the production of the historic climax plant community.

If retrogression occurs as a result of heavy grazing, seacoast bluestem, switchgrass, crinkleawn, and snoutbean are replaced by brownseed paspalum, thin paspalum, balsamscale, Wright threeawn, croton, and partridge pea.

Eventually, with continuous and heavy grazing by livestock, the site becomes dominated by plants such as red lovegrass, grassbur, thin paspalum, tumble lovegrass, hairy grama, camphorweed, croton, horsemint, and many other perennial and annual forbs. The proportion of the brush species also increases on this degraded site.

At this stage of range deterioration, much of the ground is bare, leaving the soil susceptible to wind erosion.

Sandy Loam Ecological Site

This group includes soil mapping units: BnC—Brennan loamy fine sand, 1 to 5 percent slopes, BrB—Brennan fine sandy loam, 0 to 3 percent slopes, CmB—Colmena fine sandy loam, 0 to 3 percent slopes, HeB—Hebbronville fine sandy loam, 1 to 3 percent slopes, PtB—Premont fine sandy loam, 0 to 3 percent slopes, WaB—Weesatche

fine sandy loam, 1 to 3 percent slopes, and WaC—Weesatche fine sandy loam, 3 to 5 percent slopes.

These soils are deep. They absorb rainfall readily and have a medium available water capacity.

The historic climax vegetation on this site is open grassland interspersed with a variety of mixed-brush and forbs. The brush has been kept at the same level by periodic, widespread range fires. The composition by weight is about 90 percent grasses, 5 percent woody plants, and 5 percent forbs.

About 30 percent of the climax vegetation is fourflower trichloris and tanglehead; about 20 percent is Arizona cottontop, lovegrass tridens, southwestern bristlegrass, and silver bluestem; 10 percent is plains bristlegrass and slender grama; 10 percent is hooded windmillgrass and sand dropseed; and 10 percent is pink pappusgrass. The remaining 5 percent of grasses include slim tridens, Texas bristlegrass, knotroot bristlegrass, perennial threeawn, fall witchgrass, gummy lovegrass, hairy grama, and thin paspalum. About 5 percent is forbs, including western indigo, sensitive-briar, bundleflower, milkpea, dalea, neptunia, roundleaf tephrosia, dayflower, orange zexmenia, bushsunflower, and some annual forbs.

Woody plants, including mesquite, brasil, granjeno, huisache, pricklyash, whitebrush, catclaw acacia, lotebush, pricklypear, littleleaf sumac, Berlandier wolfberry, desert yaupon, guayacan, narrowleaf elbowbush, Texas kidneywood, Texas persimmon, and ephedra, make up the remaining 5 percent of species composition.

As the range condition deteriorates from heavy and continuous grazing, fourflower trichloris, tanglehead, Arizona cottontop, southwestern bristlegrass, lovegrass tridens, and many palatable perennial forbs decrease and are eventually grazed out of the plant community. These plants are initially replaced by plains bristlegrass, slender grama, hooded windmillgrass, sand dropseed, and pink pappusgrass.

Eventually, with continued heavy use of the range and further deterioration, the understory consists mainly of annual forbs, such as sunflower and cowpea daisy, unpalatable perennial forbs, red lovegrass, red grama, Hall's panicum, grassbur, Texas bristlegrass, and goldenweed. Continuous overgrazing and a lack of periodic range fires result in a dense canopy of mesquite and other climax brush species, along with an increase of goldenweed.

At this stage of range deterioration, significantly large areas are bare, and the soil begins to crust. Because of the crusting, less water is absorbed by the soil and more water runs off the soil. Thus, there is an increased hazard of erosion.

MLRA 83B—Western Rio Grande Plain

Clay Flat Ecological Site

This group includes soil mapping unit: MwA—Monwebb clay, 0 to 1 percent slopes, occasionally flooded.

The historic climax plant community is open grassland. The composition, by weight, is 95 percent grasses, 4 percent forbs, and 1 percent woody plants. The amount of brush has been kept at a low level because of periodic widespread range fires.

The dominant plants consist of 25 percent pink pappusgrass and plains bristlegrass; 20 percent curly-mesquite and tobosagrass; 10 percent alkali sacaton; 10 percent twoflower trichloris and silver bluestem; 10 percent Arizona cottontop and lovegrass tridens; 10 percent vine-mesquite, buffalograss, white tridens and big sacaton; 5 percent fall witchgrass, slim tridens, perennial threeawn, whorled dropseed, and Texas bristlegrass; 5 percent forbs, such as bundleflower, orange zexmenia, bushsunflower, Texas varilla, and some annual forbs; and 5 percent woody plants such as mesquite, guayacan, spiny hackberry, whitebrush, fourwing saltbush, lotebush, allthorn, pricklypear, tasajillo, huisache, screwbean, and twisted acacia.

As the range condition deteriorates from heavy and continuous grazing, plants such as twoflower trichloris, Arizona cottontop, alkali sacaton, and the more palatable perennial forbs decrease in abundance. They are replaced initially by pink pappusgrass and plains bristlegrass and later by buffalograss, curly-mesquite, and woody plants. If the absence of periodic fires and overgrazing continues, the woody plants native to the site continue to increase in abundance and whitebrush, pricklypear, and other brush species invade. The woody plants dominate an understory of curly-mesquite, red grama, Hall's panicum, whorled dropseed, perennial threeawn, Texas grama, and forbs including bitterweed, goldenweed, annual broomweed, and coneflower.

Claypan Prairie Ecological Site

This group includes soil mapping unit: BuA—Brundage fine sandy loam, 0 to 2 percent slopes, rarely flooded.

This soil is deep and saline, and it has a low available water capacity. This soil has a high content of sodium. Consequently, the soil has poor structure, which impedes the movement of air, moisture and roots through the soil.

The historic climax plant community in this range is semi-open grassland supporting a scattered canopy of brush. The brush has been kept at a low level by unfavorable soil characteristics and by periodic range fires.

The dominant plants consist of 40 percent pink pappusgrass, plains bristlegrass, sand dropseed, hooded windmillgrass, and pinhole bluestem; 10 percent is twoflower and fourflower trichloris, lovegrass tridens, and Arizona cottontop; 10 percent is vine-mesquite and white tridens; 15 percent is buffalograss and curly-mesquite; 5 percent is whorled dropseed; 10 percent is fall witchgrass; slim tridens, and Texas bristlegrass; and 5 percent are forbs including bundleflower, bushsunflower, orange zexmenia, ruellia, and other forbs. Woody plants such as mesquite, whitebrush, huisache, pricklypear, tasajillo, allthorn, lotebush, granjeno, Berlandier wolfberry, and screwbean mesquite make up about 5 percent of the historic climax plant community.

As the range condition deteriorates from heavy and continuous grazing, twoflower and fourflower trichloris, Arizona cottontop, lovegrass tridens, and the most palatable forms decrease and are eventually grazed out of the plant community. These plants are replaced by pink pappusgrass, plains bristlegrass, curly-mesquite, hooded windmillgrass, and less palatable forbs and brush.

With continued heavy use of the range and further deterioration, the understory vegetation is dominated by whorled dropseed, red grama, red lovegrass, perennial threeawn, and unpalatable forbs. Goldenweed may dominate the plant community at this stage. Continued heavy use and no periodic range fires result in a moderate canopy of brush.

Gray Loamy Upland Ecological Site

This group includes soil mapping units: AgC—Aguilares fine sandy loam, 1 to 5 percent slopes, and SaC—Salco sandy clay loam, 1 to 5 percent slopes.

These soils are deep and have a low available water capacity.

The historic climax plant community on this range site are semi-open grassland supporting a scattered moderate canopy of brush. The amount of brush present has been kept at a low level because of periodic widespread range of fires.

About 35 percent of the climax vegetation is twoflower and fourflower trichloris; 15 percent is Arizona cottontop and lovegrass tridens; 25 percent is plains bristlegrass, pink pappusgrass, and silver bluestem; 5 percent is hooded windmillgrass and sand dropseed; and 5 percent is buffalograss and curly-mesquite. Other grasses, which make up about 5 percent of the historic climax plant community, include slim tridens, perennial threeawn, fall witchgrass, and Texas bristlegrass. Forbs, including bundleflower, western ragweed, dalea, bushsunflower, orange zexmenia, and some annual forbs make up about 5 percent. Woody plants, including guajillo, blackbrush, mesquite, huisache,

lotebush, bumelia, granjeno, pricklyash, coyotillo, guayacan, pricklypear, tasajillo, ephedra, narrowleaf elbowbush, ceniza, and palo verde, make up the remaining 5 percent.

As the range deteriorates from heavy and continuous grazing, and the absence of periodic fires, twoflower and fourflower trichloris, Arizona cottontop, lovegrass tridens, and many palatable perennial forbs are grazed out of the plant community.

Plants that initially increase as a result of range deterioration include plains bristlegrass, pink pappusgrass, and silver bluestem. If heavy use continues, the understory composition consists mainly of Texas bristlegrass, Hall’s panicum, red grama, perennial threeawn, and many unpalatable perennial and annual forbs.

Continued overgrazing and the absence of periodic range fires result in a dense canopy of guajillo, blackbrush, pricklypear, mesquite, and other climax brush species. Goldenweed commonly forms thick canopies under these conditions. At this stage of range deterioration, the soil surface becomes crusted, impeding the infiltration of rainfall and the germination of seeds. The potential for severe erosion is high because of the large percentage of the soil being bare.

Rolling Hardland Ecological Site

This group includes soil mapping unit: McB—Maverick clay, 1 to 3 percent slopes.

This soil is moderately deep and saline. It has a very low available water capacity.

The historic climax plant community is semi-open grassland. It is interspersed with scattered brush. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants. The brush canopy has been kept relatively open by periodic widespread range fires.

The dominant plants consist of 45 percent fourflower trichloris, lovegrass tridens, pinhole bluestem, pink pappusgrass, and plains lovegrass; 15 percent plains bristlegrass and Arizona cottontop; 15 percent buffalograss and curly-mesquite; 15 percent fall witchgrass, hooded windmillgrass, perennial threeawn, bristle panicum, and Texas bristlegrass; 5 percent forbs such as bushsunflower, bundleflower, and orange zexmenia; and 5 percent woody plants, such as guayacan, Texas kidneywood, guajillo, blackbrush, mesquite, allthorn, and fourwing saltbush.

As the range site deteriorates from both heavy and continuous grazing and the absence of fire, fourflower trichloris, plains lovegrass, bushsunflower, Arizona cottontop, and pinhole bluestem decreases. They are replaced initially by woody plants and grasses such as fall witchgrass, perennial threeawn, and curly-mesquite.

Eventually, under continued heavy use, the understory consists mainly of red grama, Hall’s panicum, whorled dropseed, Texas bristlegrass, slim tridens, and some unpalatable forbs. Saladilla invades the more abused areas. Overuse and absence of periodic range fires result in a moderate to thick canopy of blackbrush, guajillo, and other climax brush species. Goldenweed and rabbit-brush also invade under these conditions.

At this stage of deterioration, significantly large areas are bare and surface crusting results. The hard surface impedes rainfall infiltration. Evaporation increases, causing salts in the subsoil to rise nearer to the surface. Water erosion also becomes a severe problem.

Saline Clay Ecological Site

This group includes soil mapping unit: CaA—Catarina clay, 0 to 1 percent slopes.

This soil is deep to moderately deep and saline. It has a low or very low available water capacity.

The historic climax plant community on this site is generally open grassland with scattered low-growing brush species that form thin canopies. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants. The brush canopies have been kept relatively open by periodic widespread range fires and by the high salinity of the soils, which tends to stunt the growth of the brush.

The dominant plants consist of 25 percent twoflower trichloris, fourflower trichloris, and alkali sacaton; 20 percent white tridens, vine-mesquite, and pink pappusgrass; 15 percent buffalograss and curly-mesquite; 10 percent pinhole bluestem and Arizona cottontop; 10 percent plains bristlegrass; 10 percent whorled dropseed, Hall's panicum, and perennial threeawn; 5 percent forbs, such as bundleflower, screwbean mesquite, and ruellia; and 5 percent woody plants, such as armed and fourwing saltbush, spiny hackberry, mesquite, guayacan, condalia, pricklypear, and desert yaupon.

As the range site deteriorates from both heavy and continuous grazing and the absence of fire, twoflower trichloris, Arizona cottontop, alkali sacaton, and the more palatable perennial forbs decrease and are eventually grazed out of the plant community. They are replaced initially by plants such as curly-mesquite, pink pappusgrass, plains bristlegrass, Hall's panicum, and in some areas, tobosagrass.

Eventually, under continued heavy use, the understory consists mainly of a thin blanket of curly-mesquite and significant amounts of red grama, whorled dropseed, and some forbs including bitterweed and coneflower.

If there are no periodic range fires, continued over use results in a moderate canopy of mesquite and other climax brush species. Thick canopies of goldenweed commonly invade under these conditions.

At this stage of range deterioration, significantly large areas are bare and the soil begins to crust. Because of the crusting, less water is absorbed by the soil and more water runs off the soil. Thus, there is an increased hazard of water erosion. Evaporation at the surface increases, causing salts in the subsoil to rise nearer to the surface. Consequently the site becomes droughty.

Saline Clay Loam Ecological Site

This group includes soil mapping unit: MoC—Moglia clay loam, 1 to 5 percent slopes.

The historic climax plant community on this range site consists of mid and short grasses interspersed with a few woody plants. The brush canopies have been kept relatively open by periodic widespread range fires. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants.

The dominant plants consist of 35 percent white tridens, vine-mesquite, and pink pappusgrass; 15 percent twoflower trichloris; 15 percent plains bristlegrass, Arizona cottontop, and bristle panicum; 15 percent buffalograss and curly-mesquite; 10 percent fall witchgrass, Hall's panicum, and perennial threeawn; 5 percent forbs, such as bundleflower, bushsunflower, and orange zexmenia; and 5 percent woody plants, such as guajillo, blackbrush, spiny hackberry, mesquite, guayacan, condalia, pricklypear, and desert yaupon.

Trichloris, vine-mesquite, and bushsunflower are grazed out under continuous, heavy grazing by livestock. They are replaced initially by plants such as curly-mesquite and Hall's panicum and by woody plants. If overgrazing continues, woody plants continue to invade and increase in abundance and blackbrush, other brush species, broomweed, and goldenweed form a dense canopy.

MLRA 83C—Central Rio Grande Plain

Gravelly Ridge Ecological Site

This group includes soil mapping unit: GRD—Grava soils, 1 to 8 percent slopes. This soil is very shallow to shallow. It absorbs rainfall readily and has a very low available water capacity.

The historic climax plant community on this site is an open grassland interspersed with a variety of scattered woody shrubs and perennial forbs. The composition by weight is about 85 percent grasses, 5 percent forbs, and 10 percent woody plants.

The dominant plants consist of 60 percent tanglehead, green sprangletop, pinhole bluestem, plains bristlegrass, plains lovegrass, twoflower trichloris, Arizona cottontop, lovegrass tridens, sideoats grama, Neally grama, and pink pappusgrass; 20 percent reverchon panicum, fall witchgrass, slim tridens, hooded windmillgrass, hairy grama, and perennial threeawn; 5 percent buffalograss and curly-mesquite; 5 percent forbs such as bushsunflower, orange zexmenia, menodora, and bundleflower; 10 percent woody plants such as guajillo; blackbrush, range ratany, false mesquite, vine ephedra, guayacan, desert yaupon, littleleaf sumac, Texas colubrina, feather dalea, and ceniza.

Green sprangletop, plains lovegrass, pinhole bluestem, plains bristlegrass, and bushsunflower are preferred by livestock and thus are grazed out under continuous, heavy grazing by livestock. They are replaced by plants such as fall witchgrass, slim tridens, and reverchon panicum and by woody shrubs. If overgrazing continues, the site is dominated by woody plants, such as blackbrush, guajillo, littleleaf sumac, shrubby blue sage, and ceniza, and by an understory of short grasses, such as red grama, hairy tridens, perennial threeawn, Hall’s panicum, and annual forbs and grasses.

Loamy Bottomland Ecological Site

This group includes soil mapping units: AlA—Alet sandy clay loam, 0 to 1 percent slopes, frequently flooded; and StA—Sinton sandy clay loam, 0 to 1 percent slopes, occasionally flooded.

The historic climax plant community on this range site is a mixture of trees, shrubs, grasses, and forbs. The composition, by weight, is about 80 percent grasses, 15 percent woody plants, and 5 percent forbs. The frequency and amount of overflow also have an influence on the plant community make-up.

The dominant plants consist of 40 percent fourflower trichloris, southwestern bristlegrass, big cenchrus, big sacaton, and switchgrass; 15 percent white tridens, vine-mesquite, and pink pappusgrass; 15 percent buffalograss, plains bristlegrass, and sedges; 10 percent Texas wintergrass and Virginia wildrye; 5 percent forbs such as bundleflower, ruellia, and sensitive-briar; and 15 percent woody plants, such as hackberry, pecan, elm, willow, live oak, and mesquite.

Deterioration of the historic climax plant community occurs if the site is subjected to heavy and continuous grazing and the absence of fire. The taller grasses such as fourflower trichloris, switchgrass, big cenchrus, southwestern bristlegrass, and big sacaton decrease in abundance. They are replaced initially by plants such as sedges, buffalograss, hooded windmillgrass, fall witchgrass, and a diversity of woody plants. If overgrazing continues, the woody plants such as mesquite, spiny hackberry, whitebrush, and huisache continue to invade and increase in abundance and dominate an understory of sedges, red threeawn, Hall’s panicum, filly panicum, bermudagrass, tumble windmillgrass, and annual grasses and forbs.

Gray Sandy Loam Ecological Site

This group includes soil mapping units: AnC—Annarose fine sandy loam, 2 to 5 percent slopes; BdC—Benavides fine sandy loam, 2 to 5 percent slopes; CpC—Copita sandy clay loam, 1 to 5 percent slopes; GeB—Gertrudis fine sandy loam, 0 to 3 percent slopes; HoB—Houla clay loam, 0 to 3 percent slopes (fig. 11); PmC—Pernitas fine sandy loam, 1 to 5 percent slopes; and PnB—Pernitas sandy clay loam, 1 to 3 percent slopes.

These soils are moderately deep and have a low available water capacity.

The historic climax plant community on this site is an open grassland. It is interspersed with scattered woody plants. The composition, by weight, is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants. The bush canopy has been kept relatively open by periodic range fires.

The dominant plants consist of 40 percent tanglehead, fourflower trichloris, lovegrass tridens, Arizona cottontop, pinhole bluestem, and pink pappusgrass; 25 percent is fall witchgrass, vine-mesquite, buffalograss, and curly-mesquite; 20 percent is plains

Figure 11.—Brush control is often a management concern for the Houla series. HoB—Houla clay loam, 0 to 3 percent slopes, are in the Gray Sandy Loam Ecological Site. The brush species in this picture include guajillo, yucca, mesquite, and pricklypear.

bristlegrass; 5 percent perennial threeawn and slim tridens; 5 percent consists of forbs such as orange zexmenia, bundleflower, and bushsunflower; and 5 percent consists of woody plants such as mesquite, blackbrush, vine ephedra, guayacan, desert yaupon, pricklypear, Texas kidneywood, and Texas colubrina.

Tanglehead, fourflower trichloris, pinhole bluestem, and plains bristlegrass decrease in abundance under continuous heavy grazing by livestock and the absence of fire. These plants are replaced initially by plants such as hooded windmillgrass, curly-mesquite, perennial threeawn, and woody plants. Continuous overgrazing and the absence of fire will result in a dense canopy of the climax brush species over a sparse cover of plants such as perennial threeawn, Hall's panicum, western ragweed, croton, tumblegrass, red grama, sandbur, and annual weeds and grasses. Infestations of goldenweed, rabbit-brush, and perennial broomweed may also result because of heavy continuous grazing.

At this stage of range deterioration, the soil surface becomes crusted and compacted because large areas of the ground are bare. The hard surface impedes rainfall absorption, seed germination, and increases the hazard of erosion.

Ramadero Ecological Site

This group includes soil mapping unit: TaA—Tela sandy clay loam, 0 to 1 percent slopes, rarely flooded.

This soil is deep and has a high available water capacity. The soil receives extra water from surrounding ecological sites and upstream flooding.

The historic climax plant community on this range site is a semi-open riparian savannah that has an understory of productive grasses and moderate canopies of trees and tall brush species. The composition by weight is about 90 percent grasses, 5 percent

forbs, and 5 percent woody plants. Periodic range fires have been responsible for keeping the brush canopy open.

About 40 percent of the climax vegetation is twoflower and fourflower trichloris. About 10 percent is Arizona cottontop, 10 percent southwestern bristlegrass and cane bluestem, 5 percent lovegrass tridens and big cenchrus, 10 percent is plains bristlegrass and pink pappusgrass, 5 percent is curly-mesquite and buffalograss, 5 percent vine-mesquite, and 5 percent is hooded windmillgrass. Forbs such as Engelmann's daisy, bushsunflower, western ragweed, orange zexmenia, bundleflower, ruellia, dayflower, and annual forbs make up about 5 percent. The remaining 5 percent is made up of trees and shrubs such as mesquite, hackberry, granjeno, huisache, bumelia, coyotillo, white brush, pricklyash, brasil, Texas kidneywood, pricklypear, guayacan, tasajillo, Texas persimmon, ephedra, and baccharis.

The condition of the range deteriorates under continuous and heavy grazing and the absence of fire. Initially twoflower trichloris, fourflower trichloris, Arizona cottontop, southwestern bristlegrass, cane bluestem, lovegrass tridens, big cenchrus, and the most palatable forbs are grazed out. If overgrazing continues, the understory consists mainly of Hall's panicum, Texas bristlegrass, whorled dropseed, perennial threeawn, tumblegrass, unpalatable perennial forbs, and annual forbs. With no periodic range fires, overgrazing results in a dense, impenetrable thicket of mesquite, white brush, and other climax brush species.

At this stage of range deterioration, the soil forms a crust that limits rainfall penetration, seeding germination, and increases the hazard of erosion.

Red Sandy Loam Ecological Site

This group includes soil mapping units: DmB—Delmita fine sandy loam, 0 to 3 percent slopes; and the Delmita part of DRB—Delmita-Randado complex, 0 to 3 percent slopes. This soil is moderately deep and has a low available water capacity. It absorbs rainfall readily.

The historic climax plant community on this range site is semi-open grassland interspersed with scattered low shrubs and a variety of forbs. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants. The brush canopy has been kept relatively open by periodic, widespread range fires.

About 35 percent of the climax vegetation is Arizona cottontop, fourflower trichloris, and tanglehead. About 10 percent is silver bluestem, 10 percent is thin paspalum and slender grama; 10 percent is hooded windmillgrass; 5 percent is plains bristlegrass; and 5 percent is perennial threeawn. Other grasses, which make up about 10 percent of the climax vegetation, include slim tridens, hairy grama, knotroot bristlegrass, fall witchgrass, and Texas bristlegrass. Forbs, including scurfpea, bushsunflower, orange zexmenia, and menodora make up about 10 percent. About 5 percent of the species composition is composed of woody plants. These woody species are mesquite, blackbrush, Texas kidneywood, huisache, pricklyash, catclaw acacia, granjeno, algerita, lotebush, brasil, mescal bean, Texas columbrina, guayacan, desert yaupon, pricklypear, narrowleaf elbowbush, bumelia, Texas persimmon, and ephedra.

As the range condition deteriorates from heavy and continuous grazing and the absence of fire, Arizona cottontop, fourflower trichloris, tanglehead, and many palatable perennial forbs are grazed out of the plant community. These plants are replaced initially by slender grama, thin paspalum, hooded windmillgrass, and plains bristlegrass.

As the range condition continues to deteriorate, the understory composition consists mainly of perennial threeawn, hair grama, Texas bristlegrass, sandbur, red lovegrass, tumblegrass, and many unpalatable perennial and annual forbs.

If there are no periodic range fires, long-term overgrazing results in a dense canopy of mesquite, blackbrush, and other climax brush species and perennial broomweed.

At this stage of deterioration, much of the ground is bare, leaving the soil susceptible to erosion.

Shallow Ridge Ecological Site

This group includes soil mapping units: LoC—Lomart loam, 1 to 5 percent slopes, and OmD—Olmedo very gravelly sandy loam, 1 to 8 percent slopes. These soils are very shallow and have a low available water capacity.

The historic climax plant community on this range site is semi-open chaparral or shrubland that has an understory of mid and short grasses. Species composition by weight is about 85 percent grasses, 5 percent forbs, and 10 percent woody plants.

About 30 percent of the climax plant community is Arizona cottontop and pink pappusgrass. About 20 percent is tanglehead, green sprangletop, and bush muhly; 15 percent is silver bluestem; 15 percent is plains bristlegrass; 10 percent is lovegrass tridens, perennial threeawn, hairy grama, and Texas bristlegrass. About 5 percent of the climax production consists of forbs, including orange zexmenia, skeletonleaf goldeneye, bushsunflower, halfshrub sundrop, menodora, Dutchman's breeches, and some annual forbs.

Woody plants make up about 10 percent of the climax condition because of relatively low grass production. The low amount of vegetation in most years was not enough to fuel frequent range fires that would have kept the canopy more open.

Deterioration of the climax plant community occurs as the site is subjected to heavy and continuous grazing. As the range deteriorates, Arizona cottontop, tanglehead, green sprangletop, bush muhly, lovegrass tridens, plains lovegrass, and the most palatable forbs decrease and are eventually grazed out. These plants are initially replaced by pink pappusgrass, plains bristlegrass, silver bluestem, and some of the less palatable forbs. With continued heavy grazing, the plant community is dominated by threeawn, fall witchgrass, hairy grama, slim tridens, unpalatable forbs, and an abundance of shrubs or brush.

In the final stages of range deterioration, much of the ground is bare, and the soil is susceptible to erosion. In addition to low brush, which dominates the range site, only unpalatable grasses and forbs of very low quality are present.

Shallow Sandy Loam Ecological Site

This group includes soil mapping units: JdB—Jardin fine sandy loam, 1 to 3 percent slopes; MgD—Mirasol very gravelly sandy loam, 1 to 8 percent slopes; and the Piedras part of PRC—Piedras and Cuevitas soils, 1 to 5 percent slopes.

These soils are very shallow to shallow. They absorb rainfall readily and have a very low available water capacity.

The historic climax plant community on this range site is grassland interspersed with a variety of brush and forbs. The composition by weight is about 85 percent grasses, 10 percent forbs, and 5 percent woody plants.

About 30 percent of the climax vegetation is silver bluestem, tanglehead, and Arizona cottontop. About 10 percent is plains bristlegrass and pink pappusgrass; 15 percent is hooded windmillgrass, sand dropseed, and slender grama; 10 percent is perennial threeawn and slim tridens; and 5 percent is fall witchgrass. Other grasses, which make up about 10 percent of the climax vegetation, include gummy lovegrass, Texas tridens, hairy tridens, and red grama.

Perennial forbs make up about 5 percent of the climax vegetation. They include orange zexmenia, skeletonleaf goldeneye, dayflower, bush sunflower, rock daisy, dalea, menodora, and halfshrub sundrop. A variety of annual forbs also make up about 5 percent of the climax plant community.

Woody shrubs such as guajillo, blackbrush, Texas kidneywood, coyotillo, lotebush, guayacan, desert yaupon, mesquite, littleleaf sumac, ceniza, shrubby blue sage, narrowleaf elbowbush, Berlandier's croton, ephedra, knifeleaf condalia, pricklypear, and tasajillo make up the remaining 10 percent.

The brush canopy remains moderate because the relatively low grass production is not enough to fuel the range fires that would keep the canopy more open.

Deterioration of the plant community occurs as the site is heavily and continuously grazed. As the range deteriorates, silver bluestem, tanglehead, Arizona cottontop, and most palatable perennial forbs are grazed out of the plant community. These plants are initially replaced by plains bristlegrass, pink pappusgrass, hooded windmillgrass, sand dropseed, slender grama, fall witchgrass, less palatable forbs, and an increased growth of shrubs.

Eventually, as heavy use of the range continues, the understory consists mainly of perennial threeawn, slim tridens, hairy tridens, red grama, red lovegrass, sandbur, gummy lovegrass, Hall’s panicum, and many unpalatable perennial and annual forbs. In the absence of competition from strong perennial grasses and with no periodic range fires, the shrub canopy becomes dense.

At this stage of range deterioration, significantly large areas are bare, and the soil begins to crust. Because of the crusting, less water is absorbed by the soil and more water runs off the soil. Thus, there is an increased hazard of erosion.

MLRA 83E—Sandsheet Prairie

Lakebed Ecological Site

This group includes soil mapping units: PgA—Papagua fine sandy loam, 0 to 1 percent slopes; ReA—Realitos clay, 0 to 1 percent slopes; and TcA—Tiocano clay, 0 to 1 percent slopes, ponded.

The historic climax plant community on this range site is open grassland that has varying degrees of wetness. The composition by weight is about 95 percent grasses and 5 percent forbs.

The dominant plants consist of 55 percent Hartweg’s paspalum, white tridens, switchgrass, and vine-mesquite; 20 percent buffalograss and curly-mesquite; 20 percent knotroot bristlegrass, Hall’s panicum, sedges and rushes; 5 percent forbs such as ruellia, bundleflower, frog-fruit, and annuals.

Under continuous heavy grazing and the absence of periodic fires, white tridens, Hartweg’s paspalum and vine-mesquite decrease in abundance. They are replaced initially by sedges, rushes, buffalograss, bermudagrass, and knotroot bristlegrass. Retama and mesquite also invade. If overgrazing continues, the site is dominated by overstory plants such as retama and mesquite and by an understory of sedges, rushes, common bermudagrass, smallhead sneezeweed, and annual forbs.

Loamy Sand Ecological Site

This group includes soil mapping units: CoC—Comitas loamy fine sand, 0 to 5 percent slopes; DaB—Delfine loamy fine sand, 0 to 3 percent slopes, and DfB—Delmita loamy fine sand, 0 to 3 percent slopes. These soils are deep and have a medium available water capacity. They absorb rainfall readily.

The historic climax plant community on this range site is open grassland that supports scattered motts of mesquite trees and brush. Periodic fires have been responsible for keeping this site open. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants.

The dominant plants consist of 45 percent seacoast bluestem, tanglehead, and trichloris; 25 percent pinhole bluestem, Arizona cottontop, and plains bristlegrass; 15 percent fall witchgrass, hairy grama, and thin paspalum; 5 percent perennial threeawn and balsamscale; 5 percent forbs such as Engelmann’s daisy, bushsunflower, western indigo, sensitive-briar, and sida; and 5 percent woody plants such as mesquite, hackberry, Texas colubrie, spiny hackberry, pricklypear, and tasajillo. Other woodies may include brasil, Texas columbrina, allthorn, guayacan, and lantana.

The condition of the range deteriorates under heavy and continuous grazing and the absence of fire. The taller grasses such as seacoast bluestem, tanglehead, and trichloris

decrease in abundance. These plants are initially replaced by hooded windmillgrass, sand dropseed, fall witchgrass, slender grama, knotroot bristlegrass, and the less palatable forbs and brush. In some areas, balsamscale completely dominates at this stage of deterioration.

Eventually with continued heavy use, the understory consists mainly of grassbur, red lovegrass, perennial threeawn, annual grasses, and unpalatable forbs, including camphorweed, cowpea daisy, and wild buckwheat. Heavy grazing and a lack of periodic range fires can increase the brush canopy to a moderate level.

At this stage of range deterioration, much of the ground is bare, leaving the soil susceptible to erosion.

Sandy Ecological Site

This group includes soil mapping units: NfC—Nueces fine sand, 0 to 5 percent slopes, and SnC—Sarita fine sand, 0 to 5 percent slopes.

These soils are deep. They absorb rainfall readily and have a medium available water capacity.

The historic climax plant community on this rage site is open grassland that supports only occasional motts of brush. Periodic range fires have been a major factor in keeping this site open. The composition by weight is about 90 percent grasses, 5 percent forbs, and 5 percent woody plants.

About 55 percent of the climax plant community is seacoast bluestem. About 10 percent is crinkleawn; 5 percent is tanglehead; 5 percent is brownseed paspalum; 5 percent is thin paspalum; 5 percent is balsamscale, sand dropseed, and perennial threeawn; 5 percent is fall witchgrass; and 5 percent is hooded windmillgrass and knotroot bristlegrass. Perennial and annual forbs make up about 5 percent of the climax vegetation. They include snoutbean, western indigo, sensitive-briar, dalea, neptunia, partridge pea, croton, snakecotton, cardinal feather, and horsemint.

Shrubs and trees such as mesquite, catclaw, lantana, brasil, and pricklypear compose an insignificant amount of the production of the historic climax plant community.

If retrogression occurs as a result of heavy grazing, seacoast bluestem, switchgrass, crinkleawn, and snoutbean are replaced by brownseed paspalum, thin paspalum, balsamscale, Wright threeawn, croton, and partridge pea.

Eventually, with continuous and heavy grazing by livestock, the site becomes dominated by plants such as red lovegrass, grassbur, thin paspalum, tumble lovegrass, hairy grama, camphorweed, croton, horsemint, and many other perennial and annual forbs. The proportion of the brush species also increases on this degraded site.

At this stage of range deterioration, much of the ground is bare, leaving the soil susceptible to wind erosion.

Wildlife Habitat

This section prepared by Garry Stephens, Zone Biologist, NRCS

Wildlife is an extremely important resource in Duval County. Most of the land in the county will support wildlife and is leased for hunting or is used by the landowners for hunting.

Improvement and manipulation of habitat for game species has been given special emphasis in the county. The major wildlife species include white-tailed deer, javelina, bobwhite quail, scaled quail, white-winged dove, mourning dove, and Rio Grande turkey. In some locations, feral hogs are numerous. Fox, raccoon, badger, skunk, opossum, armadillo, cottontail rabbit, jackrabbit, squirrel, bats, and numerous rodents also inhabit the county. The common predators are coyote and bobcat along with an occasional mountain lion.

Intensive management of deer herds to produce quality bucks is becoming quite common. Many ranches use high fences to assist with control of deer numbers.

The successful management of wildlife requires the proper combination of food, cover, and water. A lack of any one of these elements, an unfavorable balance among them, or an inadequate distribution of them can eliminate or severely limit a desired kind of wildlife in an area. Information about soils is helpful in creating, improving, or maintaining suitable food, cover, and water for wildlife.

Most wildlife habitat is created or managed by planting suitable vegetation, by increasing the extent of existing vegetation, or improving its quality, or by a combination of these measures. The influence that most soils have on plants is known or can be inferred from knowledge of soil characteristics. Soil information is also useful in selecting sites for creating or improving water areas for wildlife.

Proper management of wildlife habitat is important. Areas of grain sorghum provide food for quail, turkey, and dove. Small grain can provide food for deer, geese, and sand hill cranes if suitable cover is nearby. Leaving crop residues on the surface can provide food for numerous species of wildlife. Cover can be provided by leaving brush in fence rows. Disking field borders can greatly improve the food supply available in pastures. Brush left in selected locations provides food and cover for both birds and mammals.

Proper management of habitat for rangeland wildlife includes several rangeland management practices. Prescribed grazing, including proper stock numbers and rest from grazing can increase the food supply available to wildlife. A good herbaceous cover can provide cover for quail and turkey and fawning areas for deer. If allowed to mature, many grasses and native forbs will provide seed for dove, quail, and turkey. Proper brush management can be extremely important for wild species. If brush is cleared or manipulated in strips, blocks, or other patterns, a much more diverse food source and habitat is created for various species of wildlife. Other measures that can improve wildlife habitat include disking, burning, planting food plots, range planting, and establishment of water sources.

Table 11, Table 12, Table 13, and Table 14 show the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The elements of wildlife habitat are described in the following paragraphs:

Ratings for *grain and seed crops for food and cover* can be used in the selection of sites that have the soil properties and plant species necessary to sustain wildlife habitat. The ratings do not reflect the limitations for commercial agronomic production. The soil properties and features that affect the growth of grain and seed crops are soil texture, content of organic matter, the amount of rock fragments on or near the soil surface, available water capacity, depth to bedrock or a cemented pan, soil moisture and temperature regimes, depth to a high water table, ponding, flooding, permeability of the soil surface, slope, presence of excess salts in the soil, and susceptibility of the soil surface to water erosion and wind erosion. Examples of grain and seed crops are corn, milo, wheat, and oats.

Ratings for *domestic grasses and legumes for food and cover* can be used in the selection of sites that have the soil properties and plant species necessary to sustain wildlife habitat. The ratings do not reflect the limitations for commercial agronomic production. The soil properties and features that affect the growth of grasses and legumes are soil texture, content of organic matter, the amount of rock fragments on or near the soil surface, available water capacity, depth to bedrock or a cemented pan, soil moisture and temperature regimes, depth to a high water table, ponding, flooding, permeability of the soil surface, slope, presence of excess salts in the soil, and susceptibility of the soil surface to water erosion and wind erosion. Examples of grasses

and legumes are kleingrass, lovegrass, yellow bluestems, Eastern gamagrass, and switchgrass; examples of legumes are clover, vetch, and cowpeas.

Ratings for *irrigated domestic grasses and legumes for food and cover* can be used in the selection of sites that have the soil properties and plant species necessary to sustain wildlife habitat. The ratings do not reflect the limitations for commercial agronomic production. The soil properties and features that affect the growth of grasses and legumes are soil texture, content of organic matter, the amount of rock fragments on or near the soil surface, available water capacity, depth to bedrock or a cemented pan, depth to a high water table, ponding, flooding, permeability of the soil surface, slope, presence of excess salts in the soil, and susceptibility of the soil surface to water erosion and wind erosion. Examples of grasses are kleingrass, yellow bluestems, Eastern gamagrass, and switchgrass; examples of legumes are clover, vetch, and soybeans.

Ratings for *habitat for burrowing mammals and reptiles* indicate the limitation of the soil for maintaining or increasing local populations of specific burrowing animals. The soil properties and features that affect the preservation of these species are flooding, ponding, depth to bedrock or a cemented pan, depth to a high water table, sandy layers, clayey layers, a high content of organic matter, and high concentrations of rock fragments. Examples of burrowing mammals and reptiles are, gophers, badgers, lizards, rattlesnakes, and bull snakes.

Ratings for *upland native herbaceous plants* indicate the limitation of the soils as a growing medium for a diverse upland herbaceous plant community. This community is adapted to soils that are drier than the common soils in moist riparian and wetland zones but that are not as dry as the soils in upland desert areas. The soil properties and features that affect the ability of these species to thrive include soil texture, available water capacity, the presence of excess salts in the soil, soil moisture and temperature regimes, depth to a high water table, and rock fragments on the soil surface. Examples of upland wild herbaceous plants are little bluestem, indiangrass, brownseed paspalum, gayfeather, tick clover, and lespedeza.

Ratings for *upland shrubs and vines* indicate the limitation of the soils as a growing medium for a diverse upland shrub and vine community. This community is adapted to soils that are drier than those common in the moist riparian and wetland zones but that are not as dry as those in upland desert areas. The soil properties and features that affect the ability of these species to thrive include soil texture, content of organic matter, available water capacity, depth to bedrock or a cemented pan, the presence of excess salts in the soil, soil moisture and temperature regimes, depth to a high water table, and rock fragments on the soil surface. Examples of upland shrubs and vines are coral berry, grape, and greenbriar.

Ratings for *riparian herbaceous plants* indicate the limitation of the soils as a growing medium for herbaceous plants that are adapted to soil conditions that are wetter than those common in the drier upland areas. The soils suitable for this habitat generally are on flood plains, in depressions, on bottomland, in drainageways adjacent to streams, or in any other area where the soil is either saturated for some period during the year or is subject to periodic overflow from ponding or flooding. The soil properties and features that affect the ability of riparian herbaceous plants to persist include soil texture, content of organic matter, depth to a high water table, the frequency and duration of ponding and flooding, the presence of excess salts in the soil, rock fragments, and the soil temperature regime. Examples of riparian herbaceous plants are Virginia wildrye, Eastern gamagrass, switchgrass, whitegrass, broadleaf woodoats, switch cane, ice plant, mist flower, and white clover.

Ratings for *riparian shrubs, vines, and trees* indicate the limitation of the soils as a growing medium for shrubs, vines, and trees that are adapted to soil conditions that are wetter than those common in the drier upland areas. The soils suitable for this habitat generally are on flood plains, in depressions, on bottomland, in drainageways adjacent to streams, in areas of springs and seeps, or in any other area where the soil is either

saturated for some period during the year or is subject to periodic overflow from ponding or flooding. The soil properties and features that affect the ability of riparian shrubs, vines, and trees to persist include available water capacity, depth to a high water table, the frequency and duration of ponding and flooding, the presence of excess salts in the soil, and the soil temperature regime. Examples of riparian shrubs, vines, and trees are cottonwood, willow, green ash, hackberry, burr oak, cedar elm, hawthorne, poison ivy, trumpet creeper, greenbriar, and grape.

Ratings for *freshwater wetland plants* indicate the limitation of the soils as a growing medium for plants that are adapted to wet soil conditions. The soils suitable for this habitat generally are in marshes, in depressions, on bottomland, in backwater areas on flood plains, in drainageways adjacent to streams, in areas of springs and seeps, or in any other area where the soil is not directly affected by moving floodwater but may be ponded during some part of the year. The soil properties and features that affect the ability of freshwater wetland plants to persist include soil texture, content of organic matter, depth to a high water table, the frequency and duration of ponding, the presence of excess salts in the soil, and soil reaction (pH). Examples of freshwater wetland plants are smartweed, wild millet, cattails, cut grass, giant cane, rattle box, sesbania, rushes, sedges, and reeds.

Recreation

Duval County, with its location, highways, climate, and natural resources, has a high potential for numerous outdoor recreational activities. Duval's relatively close proximity to major urban areas, such as San Antonio, Laredo, Brownsville (and other cities along the Rio Grande Valley), and Houston, make it a popular destination for weekend trips. U.S. Highway 16 and U.S. Highway 59 dissect Duval County, and help serve as convenient conduits for traffic coming from those urban areas. In the winter, Duval County often provides a temporary rest-stop for the south-bound vacationers who are escaping cold, northern weather. In the summer, warm, dry conditions are suited to camping, hiking, and riding all-terrain vehicles (ATV's). In the winter, mild temperatures provide ideal conditions for observing song birds, migrating along the central flyway.

Wildlife is among the most economically important natural resources in Duval County. South Texas is world-renown for quality deer hunts, and many game ranches in Duval County specifically manage for maximum wildlife production. Deer, turkey, quail, dove, feral hogs, and javelina are all important game species.

The soils of the survey area are rated in Table 15 and Table 16 according to limitations that affect their suitability for recreation. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and

accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in Table 15 and Table 16 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a seasonal high water table, ponding, flooding, and texture of the surface layer.

Golf course fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.
The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Hydric Soils

In this section, hydric soils are defined and described.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 1995). The criteria are used to identify a phase of a soil series that normally is also a hydric soil. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2003) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period to be considered hydric, they generally exhibit certain properties that can be observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 1998).

Information regarding hydric soils in the soil survey area, can be found on the internet at http://soildatamart.nrcs.usda.gov or the local office of the Natural Resources Conservation Service.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because

of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earth fill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Table 17 and Table 18 show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced

concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and/ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Table 19 and Table 20 show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill.

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in down slope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan,

depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Table 21 and Table 22 provide information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 21, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand/or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand/or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand/or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair*, or *poor* as potential sources of sand and gravel. A rating of good or fair means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair*, or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is

affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

Table 23 provides information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering soil properties, physical and chemical properties, and pertinent soil and water features.

Engineering Soil Properties

Table 24 provides the engineering classifications and the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters across. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches across and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches across is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2 4, A-2 5, A-2 6, A-2 7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches across and 3 to 10 inches across are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches across based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Soil Properties

Table 25 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle-size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle-sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of clay affects the physical behavior of a soil. Particle-size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K-sat) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K-sat). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3-or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 23, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 23 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Soil Properties

Table 26 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter (mmhos/centimeters) or decisiemens per meter (dS/m) at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

Table 27 provides estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 25 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely gray colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 25 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 28 provides estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the *hardness* and *thickness* of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens *uncoated steel* or *concrete*. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical, Chemical, and Clay Mineralogy Analyses and Optical Grain Counts of Selected Soils

The results of physical analysis of several typical pedons in the survey area are shown in Table 29, the results of chemical analysis in Table 30, the results of clay mineralogy are shown in Table 31, and the optical grain counts are shown in Table 32. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the

pedons are typical of the series. They are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by USDA-NRCS, National Soil Survey Laboratory at Lincoln, Nebraska, and Soil Characterization Laboratory, Texas A&M University, College Station, Texas.

Depth to the upper and lower boundaries of each layer is indicated.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters across. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (USDA, 1996).

Sand—(0.05-to 2.0-millimeter fraction) weight percentages of material less than 2 millimeters (3A1).

Silt—(0.002 to 0.05-millimeter fraction) pipette extraction, weight percentages of all material less than 2 millimeters (3A1).

Clay—(fraction less than 0.002 millimeters) pipette extraction, weight percentages of material less than 2 millimeters (3A1).

Coefficient of linear extensibility—change in clod dimension based on whole soil (3D4).

Bulk density—of less than 2 millimeter material, saran-coated clods field moist (3B1a), 1/3 bar (3B1b), ovendry (3B1c).

Water retained—pressure extraction, percentage of ovendry weight of less than 2 millimeter material; 1/3 or 1/10 bar (3C1), 15 bars (3C2).

Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c, obsolete).

Reaction (pH)—1:1 water dilution (4C1a2a1).

Extractable cations—ammonium acetate pH 7.0, ICP; calcium (6N2e, 6N2f), magnesium (6O2d, 6O2e), sodium (6P2b, 6P2c), potassium (6Q2b, 6Q2c).

Cation exchange capacity—NH_4OAc.

Base saturation—ammonium acetate, pH 7.0 (5C1).

Sodium adsorption ratio (SAR)—(4F3b).

Electrical conductivity—saturation extract (4F2b1).

Carbonate as calcium carbonate—(fraction less than 20 millimeter) manometric (6E4).

Gypsum—precipitation in acetone (6F1a).

X-ray diffraction—thin film on glass, resin pretreatment II (7A2i).

Optical Grain Count—(7B1a).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 33 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in sol. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (Ust, meaning burnt, plus oll, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplustolls (Hapl, meaning minimal horizonation, plus ustolls, the suborder of the Mollisols that has an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective Aridic identifies the subgroup that typifies the great group. An example is Aridic Calciustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, hyperthermic, Aridic Calciustolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. An example is Houla.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999)

and in "Keys to Soil Taxonomy" (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

It should be noted that a few of the typical pedons described below have a different surface layer texture phase than what is described in some of the map units for Duval County. Although the map unit surface texture phases may be different from that of the typical pedon of the series, it falls within the range of characteristics for the series. All soil interpretations in the Duval County soil survey are based on the surface texture phase of the map unit for the county

Aguilares Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Interfluves
Parent material: Calcareous loamy residuum weathered from sandstone predominantly from the Jackson Formation
Slope range: 1 to 5 percent
Associated soils: Brennan, Brundage, Copita, Moglia, and Tela soils
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Aridic Calciustepts
Other information: The Aguilares soils in this survey area are taxadjuncts because the series has a fine-loamy particle-size control section, but lab data from Duval County samples show to have a coarse-loamy particle-size control section.

Typical Pedon

Aguilares fine sandy loam, 1 to 5 percent slopes; in Duval County, Texas (fig. 12); from the intersection of U.S. Highway 59 and Texas State Highway 44, 4.07 miles west on U.S. Highway 59, 2.8 miles southeast on ranch road, 1.14 miles southwest on ranch road, 1.63 miles southeast and south on ranch road, 2.1 miles southwest on ranch road, 1.35 miles west on ranch road, 4,300 feet southwest on ranch road, and 250 feet west in range. Biel Lake, Texas USGS topographic quadrangle; Latitude: 27 degrees, 45 minutes, 8.2 seconds North; Longitude: 98 degrees, 45 minutes, 58.0 seconds West; NAD 83.

A—0 to 4 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3), moist; 10 percent clay; weak medium subangular blocky structure parting to weak fine subangular blocky; few fine roots; slightly effervescent; slightly alkaline; abrupt smooth boundary.

Bk1—4 to 10 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3), moist; moderate fine and medium subangular blocky structure; 1 percent fine threadlike carbonate, finely disseminated and 1 percent fine carbonate masses; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—10 to 27 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3), moist; moderate fine and medium subangular blocky structure; 1 percent fine threadlike carbonate masses, finely disseminated, and 1 percent fine carbonate masses; 1 percent medium carbonate masses; strongly effervescent; moderately alkaline; gradual smooth boundary.

BCk—27 to 80 inches; pale brown (10YR 6/3) gravelly sandy clay loam, brown (10YR 5/3), moist; weak fine subangular blocky structure; 20 percent threadlike carbonate masses around rock fragments; 20 percent sandstone pararock fragments; strongly effervescent; moderately alkaline.

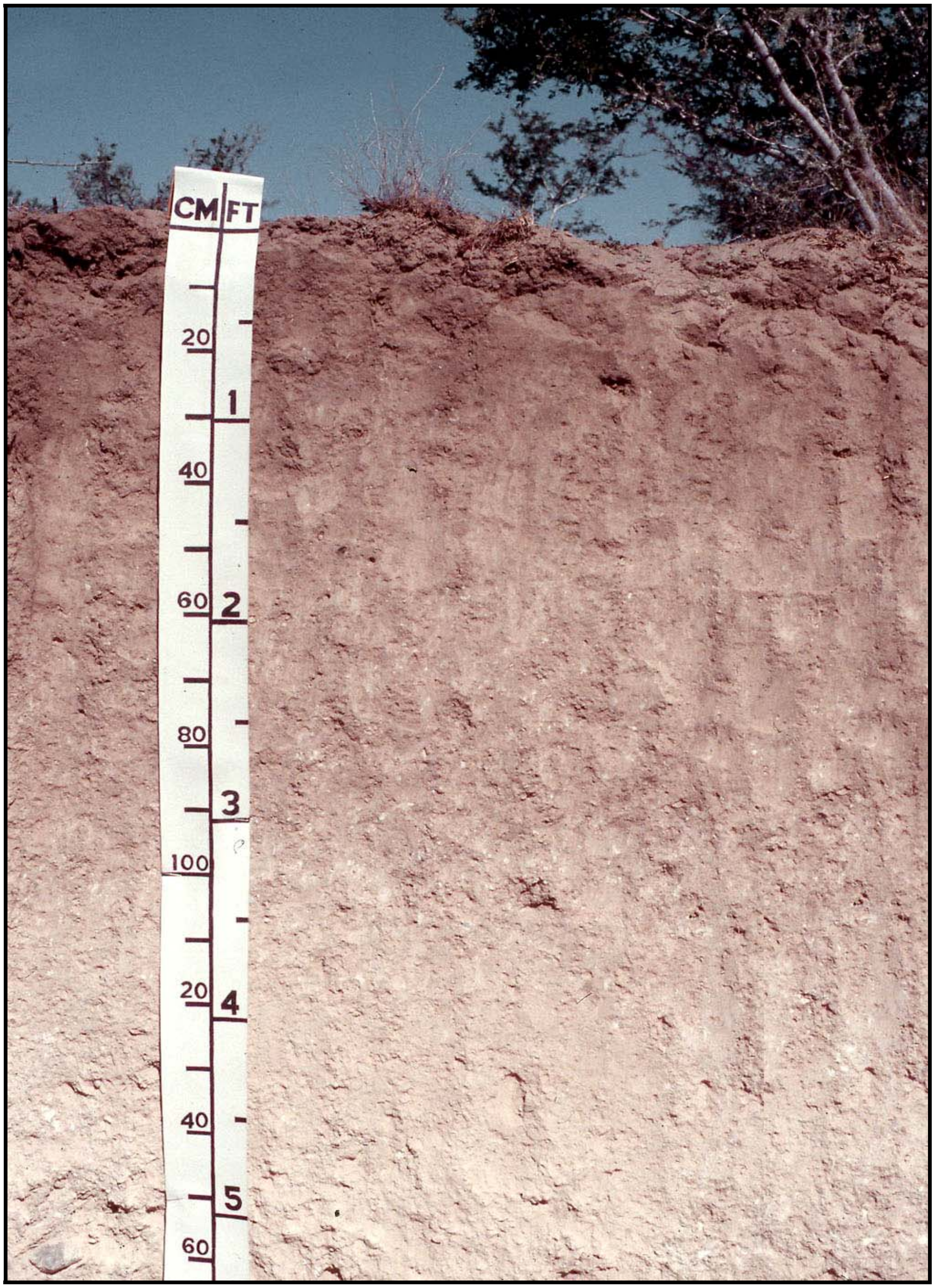

Figure 12.—Profile of Aguilares fine sandy loam, 1 to 5 percent slopes. Calcium carbonate masses increase with depth, and salt accumulations increase at 60 inches (150 centimeters). (Scale in cm—centimeters, and ft—feet)

Range in Characteristics

Depth to calcic horizon: 10 to 35 inches
Depth to salt accumulations: 20 to 40 inches
Coarse fragments: 0 to 15 percent within any horizon

A horizon

Hue: 10YR
Value: 4 to 6
Chroma: 2 or 3
Texture: Fine sandy loam
Clay content: 10 to 30 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 0 to 10 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
SAR: 0 to 2
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bw horizon (where present)

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Clay content: 20 to 40 percent total clay
Carbonate clay: 1 to 20 percent
Pararock fragments: 0 to 5 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 0 to 10 percent
Gypsum: 0 to 1 percent
EC (dS/m): 1 to 4 above 30 inches; more than 16 below 30 inches
SAR: 10 to 40
Effervescence: Strong or violent
Reaction: Moderately alkaline

Bk horizon

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Clay content: 20 to 40 percent total clay
Carbonate clay: 1 to 20 percent
Pararock fragments: 0 to 5 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 15 to 35 percent
Gypsum: 0 to 1 percent
EC (dS/m): 1 to 4 above 30 inches; more than 16 below 30 inches
SAR: 10 to 40
Effervescence: Strong or violent
Reaction: Moderately alkaline

BCk horizon (or C horizon where present)

Hue: 7.5YR to 2.5Y
Value: 5 to 8
Chroma: 3 or 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 10 to 40 percent total clay
Carbonate clay: 1 to 20 percent
Pararock fragments: 5 to 35 percent

Base saturation: 100 percent
Calcium carbonate equivalent: 15 to 35 percent
Gypsum: 0 to 10 percent
EC (dS/m): 8 to more than 16
SAR: 10 to 40
Effervescence: Strong or violent
Reaction: Moderately alkaline

Alet Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Drainageways
Parent material: Loamy alluvial sediments derived predominantly from material weathered from the Goliad Formation
Slope range: 0 to 1 percent
Associated soils: Colmena, Clareville, Czar, Pernitas, Premont, and Weesatche
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Typic Argiustolls

Typical Pedon

Alet sandy clay loam, 0 to 1 percent slopes, rarely flooded; in Duval County, Texas; from the intersection of Farm Road 2295 and Texas Highway 339 in Benavides; 15.5 miles west on Farm Road 2295, 6.0 miles south on Texas Highway 16; 100 feet west in rangeland. Hebbronville NW, Texas USGS topographic quadrangle; Latitude: 27 degrees, 29 minutes, 12 seconds N; Longitude: 98 degrees, 39 minutes, 55 seconds W.

A—0 to 7 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky and granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; noneffervescent; moderately alkaline; clear smooth boundary.

Bt1—7 to 15 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; hard, firm; slightly sticky and plastic; common fine roots; common faint clay films on surfaces of peds; common fine and medium insect tunnels; noneffervescent; moderately alkaline; clear smooth boundary.

Bt2—15 to 31 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; very hard, very firm, sticky and plastic; few very fine and fine roots; common fine pores; common faint clay films on surfaces of peds; noneffervescent; slightly alkaline; clear smooth boundary.

Bt3—31 to 46 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate fine and medium angular blocky structure; very hard, very firm; sticky and plastic; few very fine roots; many faint clay films on surfaces of peds; 1 percent round siliceous pebbles less than 1 inch in diameter; noneffervescent; slightly alkaline; clear smooth boundary.

Btk1—46 to 61 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; weak fine and medium subangular blocky and granular structure; very hard, very firm, sticky and plastic; few very fine and fine roots; few faint clay films on surfaces of peds; 5 percent fine and medium threads of calcium carbonate; violently effervescent; moderately alkaline; clear smooth boundary.

Btk2—61 to 80 inches; very pale brown (10YR 7/3) sandy clay loam, pale brown (10YR 6/3) moist; weak fine and medium subangular blocky and granular structure; hard, firm, slightly sticky and plastic; few very fine and fine roots; few faint clay films on

surfaces of peds; 10 percent fine and medium films and threads of calcium carbonate; violently effervescent; moderately alkaline.

Range in Characteristics

Solum thickness: Greater than 80 inches
Depth to argillic horizon: 7 to 19 inches
Depth to secondary calcium carbonate: 25 to 50 inches
Coarse fragments: 0 to 10 percent gravel

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Sandy clay loam
Clay content: 20 to 25 percent
Coarse fragments: 0 to 5 percent siliceous gravel
Base saturation: 90 to 100 percent
Calcium carbonate equivalent: 0 to 5 percent
EC (dS/m): 0 to 4
SAR: 0 to 2
Effervescence: Noneffervescent to slight
Reaction: Neutral to moderately alkaline

Bt Horizon

Hue: 10YR
Value: 4 to 7
Chroma: 2 to 4
Texture: Loam, sandy clay loam, or clay loam
Clay content: 25 to 30 percent
Coarse fragments: 0 to 10 percent gravel
Base saturation: 90 to 100 percent
Calcium carbonate equivalent: 0 to 5 percent
EC (dS/m): 0 to 4
SAR: 0 to 4
Effervescence: Noneffervescent
Reaction: Slightly alkaline or moderately alkaline

Btk Horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 2 to 4
Texture: Loam, sandy clay loam, or clay loam
Clay content: 20 to 30 percent
Coarse fragments: 0 to 10 percent gravel
Base saturation: 95 to 100 percent
Calcium carbonate equivalent: 5 to 15 percent
Identifiable secondary carbonate: 3 to 15 percent, fine and medium, masses and nodules, throughout
EC (dS/m): 2 to 8
SAR: 2 to 10
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Annarose Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Landform: Ridge or interfluve
Parent material: Residuum derived from sandstone of the Oakville Formation and the Fleming Formation
Slope range: 2 to 5 percent
Associated soils: Alet, Pernitas, and Weesatche
Taxonomic class: Coarse-loamy, mixed, superactive, hyperthermic, Aridic Calciustepts

Typical Pedon

Annarose fine sandy loam, 2 to 5 percent slopes; in Live Oak County, Texas; from the intersection of U.S. Highway 59 and U.S. Highway 281 in George West, 2.4 miles north on U.S. Highway 281, 12.6 miles southwest on Farm Road 889, 0.4 mile southeast on private road, and 100 feet east in rangeland. Clegg NE, Texas USGS topographic quadrangle; Latitude: 28 degrees, 12 minutes, 42 seconds North; Longitude: 98 degrees, 17 minutes, 32 seconds West; NAD 1927.

A—0 to 9 inches; pale brown (10YR 6/3) fine sandy loam; brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; 80 percent of surface has a massive crust about 1/4 inch thick with 5 percent cover of lichen growth; hard, friable; common fine and few medium and coarse roots; common fine and few medium tubular pores; few snail shell fragments; common wormcasts; violently effervescent; moderately alkaline; clear smooth boundary.

Bw1—9 to 16 inches; light yellowish brown (10YR 6/4) sandy clay loam; yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; hard, friable; common medium roots; common very fine, fine, and medium tubular pores; few snail shell fragments; few rounded chert fragments; few films and threads of calcium carbonate; common wormcasts; violently effervescent; moderately alkaline; clear smooth boundary.

Bw2—16 to 25 inches; light yellowish brown (10YR 6/4) sandy clay loam; yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; hard, friable; few fine and medium roots; common very fine and fine, and few medium and coarse tubular pores; few rounded weakly cemented chalk fragments and few rounded chert fragments; few fine threads of calcium carbonate; few wormcasts; violently effervescent; moderately alkaline; clear wavy boundary.

Bk1—25 to 35 inches; very pale brown (10YR 7/3) sandy clay loam; light yellowish brown (10YR 6/4) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; hard, friable; few fine and medium roots; many very fine and fine, and common medium tubular pores; few wormcasts; few rounded weakly cemented chalk fragments and few rounded chert fragments; 10 percent coatings, threads, concretions and masses of calcium carbonate; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—35 to 43 inches; very pale brown (10YR 7/3) fine sandy loam; light yellowish brown (10YR 6/4) moist; weak medium and coarse prismatic structure parting to weak medium subangular blocky; hard, firm; few fine and medium roots; many very fine and fine, and common medium tubular pores; few wormcasts; common rounded weakly cemented chalk fragments; 15 percent coatings, threads, concretions and masses of calcium carbonate; violently effervescent; moderately alkaline; clear wavy boundary.

BCk—43 to 50 inches; 60 percent very pale brown (10YR 7/3) and 40 percent very pale brown (10YR 8/2) fine sandy loam; light yellowish brown (10YR 6/4) and light gray

(10YR 7/2) moist; weak medium and coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; common fine and few medium and coarse roots; common fine and few medium tubular pores; common wormcasts; 10 percent coatings, threads, masses, and concretions of calcium carbonate; violently effervescent; moderately alkaline; gradual wavy boundary.

Cd1—50 to 69 inches; very pale brown (10YR 8/2) noncemented sandstone, and about 10 percent very pale brown (10YR 7/3) fine sandy loam; light gray (10YR 7/2), and light yellowish brown (10YR 6/4) moist; massive; hard, firm; few very fine and fine roots in fractures; common very fine and fine tubular pores; fractures are spaced 5 to 15 inches apart; 8 percent by volume threads and masses of calcium carbonate; 80 percent of matrix is violently effervescent with 20 percent noneffervescent; moderately alkaline; gradual wavy boundary.

Cd2—69 to 80 inches; very pale brown (10YR 8/2) noncemented sandstone, and about 10 percent very pale brown (10YR 7/3) fine sandy loam along fractures; light gray (10YR 7/2), and light yellowish brown (10YR 6/4) moist; massive; hard, firm; few very fine and fine roots in fractures; common very fine and fine tubular pores; fractures are spaced 10 to 20 inches apart; 5 percent by volume threads and masses of calcium carbonate; 60 percent of matrix is violently effervescent with 40 percent noneffervescent; moderately alkaline.

Range in Characteristics

Depth to calcic horizon: 25 to 50 inches
Depth to cambic horizon: 9 to 25 inches
Depth to densic contact: 40 to 60 inches
Depth to secondary calcium carbonate: 10 to 30 inches
Clay content, carbonate-free basis: 10 to 18 percent
Carbonate clay content: 5 to 10 percent

A horizon

Hue: 10YR
Value: 4 to 6
Chroma: 2 or 3
Texture: Fine sandy loam or loam
Calcium carbonate equivalent: 10 to 25 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Bw horizon

Hue: 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Calcium carbonate equivalent: 20 to 35 percent
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Bk horizon and BCk horizon

Hue: 10YR
Value: 6 to 8
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Calcium carbonate equivalent: 20 to 35 percent
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Cd horizon

Hue: 10YR
Value: 7 or 8
Chroma: 2 or 3
Texture: Noncemented sandstone with textures of loamy fine sand or fine sandy loam
Calcium carbonate equivalent: 15 to 30 percent
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline
Other notes: After 1 hour to 4 hours in water, the material slakes.

Benavides Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Interfluves
Parent material: Residuum and colluvium derived from loamy, calcareous sediments of the Goliad Formation
Slope range: 2 to 5 percent
Associated soils: Cuevitas, Delmita, Olmedo, Pernitas, Randado, and Weesatche
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Aridic Calciustolls

Typical Pedon

Benavides fine sandy loam, 2 to 5 percent slopes; in Duval County, Texas; from the intersection of Texas Highway 359 and Texas Highway 339 in Benavides, 11.2 miles northwest on Texas Highway 339, 1.0 mile southwest on county road, southeast 2.7 miles on private ranch road, west 0.6 mile on field road, and 20 feet south in rangeland (fig. 13). Parilla Creek NE, Texas USGS topographic quadrangle; Latitude: 27 degrees, 40 minutes, 32 seconds North; Longitude: 98 degrees, 32 minutes, 31 seconds West; NAD 83.

A—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; common fine and few medium roots; few snail shell fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—8 to 14 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; hard, firm, sticky and slightly plastic; common fine and few medium roots; 2 percent nodules of calcium carbonate less than 1 centimeter in diameter; 1 percent films and threads of calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—14 to 26 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; hard, firm, sticky and slightly plastic; few fine and medium roots; 1 percent nodules of calcium carbonate less than 2 millimeters in diameter; 5 percent films and threads of calcium carbonate; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—26 to 32 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; very hard, very firm, sticky and plastic; few fine roots; 10 percent nodules of calcium carbonate less than 7 millimeters in diameter; 5 percent films and threads of calcium carbonate; violently effervescent; slightly alkaline; clear wavy boundary.

Bk4—32 to 50 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; very hard, very firm, sticky and plastic; few fine roots; 10 percent nodules of calcium carbonate less than 3 millimeters in

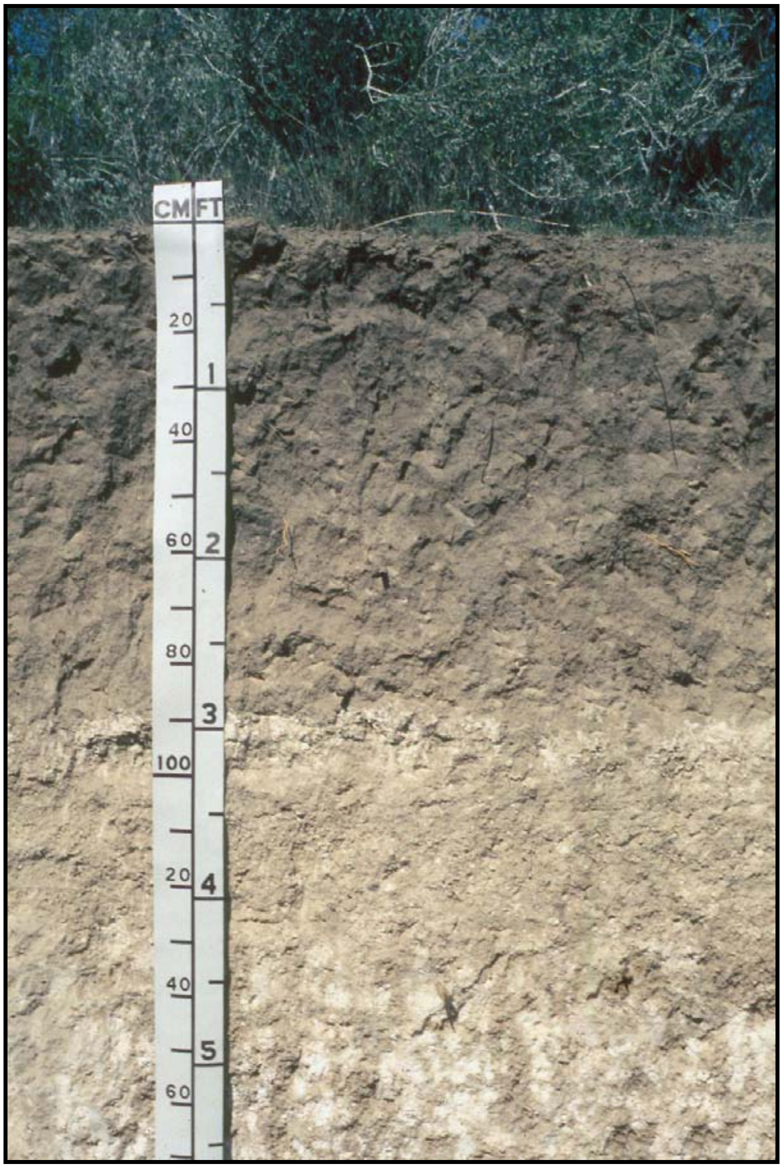

Figure 13.—Profile of Benavides fine sandy loam, 2 to 5 percent slopes. Calcium carbonates dominate the soil profile because of the calcareous nature of the residuum and colluvium from which this soil formed. (Scale in cm—centimeters, and ft—feet)

diameter; 5 percent films and threads of calcium carbonate; violently effervescent; slightly alkaline; clear wavy boundary.

BCk—50 to 80 inches; very pale brown (10YR 8/3) sandy clay loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; 8 percent nodules of calcium carbonate less than 3 millimeters in diameter; 5 percent films and threads of calcium carbonate; violently effervescent; slightly alkaline.

Range in Characteristics

Solum thickness: Greater than 80 inches
Depth to secondary calcium carbonates: 5 to 12 inches

Depth to calcic horizon: 12 to 30 inches
Coarse fragments: 0 to 5 percent calcrete gravel

A Horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Fine sandy loam
Clay content: 15 to 20 percent
Calcium carbonate equivalent: 1 to 10 percent
Identifiable secondary calcium carbonate: 0 to 8 percent, fine to coarse, nodules, throughout
Base saturation: 90 to 100 percent
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bk Horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Clay content: 18 to 30 percent
Calcium carbonate equivalent: 10 to 40 percent
Identifiable secondary calcium carbonate: 0 to 25 percent, fine to coarse, masses and nodules, throughout
Base saturation: 100 percent
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

BCk Horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 15 to 25 percent
Calcium carbonate equivalent: 15 to 40 percent
Identifiable secondary calcium carbonate: 0 to 10 percent, fine to coarse, masses and nodules, throughout
Base saturation: 100 percent
Effervescence: Strong or violent
Reaction: Moderately alkaline

Brennan Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Vegetated sandsheet
Parent material: Eolian sands over calcareous loamy alluvium of the Sandsheet Prairie
Slope range: 0 to 5 percent
Associated soils: Copita, Hebbronville, and Tela
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Aridic Haplustalfs

Typical Pedon

Brennan fine sandy loam, 0 to 3 percent slopes; in Jim Hogg County, Texas; from the intersection of Texas Highway 16 and Farm Road 649, 50 feet west and 100 feet south in rangeland. Randado, Texas USGS topographic quadrangle; Latitude: 27 degrees, 04 minutes, 4.00 seconds North; Longitude: 98 degrees, 51 minutes, 26.00 seconds West; NAD 83.

A1—0 to 3 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable; many roots; neutral; gradual smooth boundary.

A2—3 to 12 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable; many roots; neutral; gradual wavy boundary.

Bt1—12 to 26 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak coarse, prismatic structure parting to weak medium subangular blocky; hard, friable; many roots; common pores; sand grains coated and bridged with clay; few films and masses of calcium carbonate in lower part; neutral; gradual wavy boundary.

Bt2—26 to 51 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist: weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; common roots: common fine pores; sand grains coated and bridged with clay; common films and masses of calcium carbonate; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk1—51 to 58 inches; very pale brown (10YR 7/4) sandy clay loam, light yellowish brown (10YR 6/4) moist; weak fine and medium, subangular blocky structure; hard, friable; common fine pores; few masses of calcium carbonate; 5 percent rounded siliceous pebbles; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—58 to 65 inches; very pale brown (10YR 7/4) sandy clay loam, light yellowish brown (10YR 6/4) moist; massive; hard, friable; few roots; common fine pores; 3 percent masses and concretions of calcium carbonate; few siliceous pebbles; few small shell fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

BCk—65 to 80 inches; very pale brown (10YR 7/4) fine sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable; few fine pores; few siliceous pebbles; few small shell fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to argillic horizon: 8 to 18 inches
Depth to secondary calcium carbonate: 12 to 36 inches
Depth to calcic horizon: 40 to 60 inches
Coarse fragments: 0 to 10 percent

A horizon

Hue: 7.5YR or 10YR
Value: 4 or 5
Chroma: 2 to 4. The soil has colors and organic carbon that meets the requirements for a mollic epipedon, but the surface is both massive and hard when dry.
Texture: Loamy fine sand or fine sandy loam
Clay content: 8 to 18 percent
Base saturation: 75 to 100 percent
EC (dS/m): 0 to 2
SAR: None
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 7.5YR or 10YR
Value: 5 or 6
Chroma: 2 to 6
Texture: Loam or sandy clay loam
Clay content: 18 to 30 percent
Clay films: Few or common, faint or distinct, on surfaces of peds and lining pores
Coarse fragments: 0 to 10 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 0 to 5 percent
Identifiable secondary carbonate: 0 to 2 percent, very fine and fine, films, threads and masses, on surfaces of peds
Gypsum: 0 to 2 percent
EC (dS/m): 0 to 4
SAR: 0 to 1
Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline or moderately alkaline

Bk horizon and BCk horizons (where present)

Hue: 7.5YR or 10YR
Value: 6 or 7
Chroma: 3 or 4
Texture: Loam or sandy clay loam
Clay content: 18 to 30 percent
Coarse fragments: 0 to 10
Base saturation: 100 percent
Calcium carbonate equivalent: 15 to 40 percent
Identifiable secondary carbonate: 2 to 20 percent, fine or medium, nodules, masses, films, and threads, on surfaces of peds
Gypsum: 0 to 2 percent
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Slight to violent
Reaction: Moderately alkaline

Brundage Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slowly
Landform: Flood plain steps
Parent material: Saline, loamy alluvium
Slope range: 0 to 2 percent
Associated soils: Brennan, Catarina, Monwebb, and Tela
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Aridic Natrustalfs

Typical Pedon

Brundage fine sandy loam, 0 to 2 percent slopes, rarely flooded; in Maverick County, Texas; from the intersection of U.S. Highway 277 and Texas Highway 57 in Eagle Pass 14.6 miles northeast on Texas Highway 57, 4.2 miles southwest on pipeline road, and 150 feet west in rangeland. Indian Tank, Texas USGS topographic quadrangle; Latitude: 28 degrees, 47 minutes, 37 seconds North; Longitude: 100 degrees, 19 minutes, 26 seconds West; NAD 83.

A—0 to 3 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, very friable slightly sticky and slightly plastic; common fine roots; 6 millimeters (1/4 inch) platy crust on surface; noneffervescent; slightly acid; abrupt smooth boundary.

Btn—3 to 9 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium and coarse columnar structure parting to moderate fine and medium subangular blocky and angular blocky; thin light gray (10YR 7/2) caps about 1 to 5 millimeters thick on columns; very hard, firm, slightly sticky and slightly plastic; few fine roots; very few fine pores and root channels; few distinct clay films on surfaces of peds; noneffervescent; slightly alkaline; clear wavy boundary.

Btknz1—9 to 24 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; weak medium and coarse columnar structure parting to moderate fine and medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few fine roots; very few fine pores and old root channels; few distinct clay films on surfaces of peds; 2 percent 1 to 2 millimeters masses and 2 percent threads of calcium carbonate; slightly effervescent; slightly saline; moderately alkaline; gradual wavy boundary.

Btknz2—24 to 38 inches; very pale brown (10YR 7/4) sandy clay loam, light yellowish brown (10YR 6/4) moist; moderate fine and medium subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few fine roots; few fine and medium pores and root channels; 3 percent masses of calcium carbonate; violently effervescent; moderately saline; moderately alkaline; gradual wavy boundary.

BCknz—38 to 80 inches; pale yellow (2.5Y 7/4) sandy clay loam, light yellowish brown (2.5Y 6/4) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; 10 percent masses of calcium carbonate; few fine and medium faint yellowish brown (10YR 5/4) and olive yellow (2.5Y 6/6) masses of iron accumulation; violently effervescent; moderately saline; moderately alkaline.

Range in Characteristics

Solum thickness: 50 to more than 80 inches
Depth to argillic (natric) horizon: 1 to 12 inches, corresponding to the thickness of the A horizon
Depth to secondary calcium carbonate: 6 to 22 inches
Depth to redox concentrations: 25 to 40 inches
Clay content: 22 to 35 percent
Coarse fragments: 0 to 5 percent

A horizon

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, very fine sandy loam, or loam
Other features: Some Ap horizons are sandy clay loam
Clay content: 10 to 20 percent
Base saturation: 75 to 100
Calcium carbonate equivalent: 0 to 1 percent
EC (dS/m): 1 to 4
Gypsum: 0 to 1 percent
SAR: 0 to 12
Effervescence: Noneffervescent or very slight
Reaction: Slightly acid or neutral

Btn and Btknz horizons

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 2 to 4
Texture: Sandy clay loam or clay loam
Clay content: 22 to 35 percent
Clay films: Few to many, faint to prominent, on surfaces of peds or lining pores
Redox concentrations: Upper part—none to few, fine to medium, faint to distinct on surfaces and interiors of peds; lower part—few to common, fine and medium, faint to prominent, on ped surfaces and interiors
Redox depletions: Upper part—none; lower part—none to few, fine to medium, faint to distinct, on surfaces of peds
Coarse fragments: 0 to 5 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 0 to 20 percent
Identifiable secondary carbonate: 1 to 19 percent, fine to medium, in the form of films and masses
EC (dS/m): 2 to 16 in the upper part and 8 to 16 in the lower part
Gypsum: 0 to 5 percent
SAR: 15 to 40 in the upper part and 5 to 40 in the lower part
Effervescence: Very slight to violent
Reaction: Slightly acid to slightly alkaline in the upper part and slightly alkaline or moderately alkaline in the lower part

BCknz horizon

Hue: 7.5YR to 2.5Y
Value: 5 to 8
Chroma: 3 to 6
Texture: Sandy clay loam or clay loam
Clay content: 22 to 30 percent
Redox concentrations: Few to common, fine and medium, faint to prominent
Redox depletions: None to few, fine and medium, faint to distinct
Coarse fragments: 0 to 5
Base saturation: 100 percent
Calcium carbonate equivalent: 5 to 50 percent
Identifiable secondary carbonate: 1 to 19 percent, fine to medium in the form of films and masses
EC (dS/m): 8 to 16
Gypsum: 0 to 5 percent
SAR: 5 to 50
Effervescence: Slight to violent
Reaction: Moderately alkaline

C horizon (where present)

In some pedons, below 50 inches, the C horizon is sandy clay loam, clay loam, or these textures are intermingled with soft shale fragments or fractured soft shale or soft siltstone bedrock that slakes to clay loam or clay.

Catarina Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow

Landform: Valley sides and valley floors
Parent material: Calcareous, saline, clayey alluvium
Slope range: 0 to 1 percent
Associated soils: Brennan, Brundage, Moglia, Monwebb, and Tela
Taxonomic class: Fine, smectitic, hyperthermic, Sodic Haplusterts

Typical Pedon

Catarina clay, 0 to 1 percent slopes; in Webb County, Texas; from the intersection of Interstate 35 and U.S. Highway 59 in Laredo, about 12 miles north on Interstate 35 to main entrance of Uniroyal Tire Testing Facility, 4.35 miles southeast to plant materials test plot, and 100 feet east of plot in rangeland. Orvil, Texas USGS topographic quadrangle; Latitude: 27 degrees, 40 minutes, 25 seconds North; Longitude: 99 degrees, 24 minutes, 12 seconds West; NAD 83.

Ay—0 to 3 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; moderate fine and very fine granular and very fine angular blocky structure; very hard, friable, sticky and plastic; common very fine and fine roots; few fine pores; few siliceous pebbles, 5 percent films and threads of gypsum along crack faces; strongly effervescent; slightly alkaline; clear smooth boundary.

Bnssy—3 to 14 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure parting to moderate medium angular blocky; extremely hard, firm, sticky, and plastic; common very fine and medium roots; common fine and very fine pores; few distinct slickensides increasing in size with depth; few wormcasts; few siliceous pebbles; 2 percent films and threads of gypsum, mostly on crack faces; very slightly saline; strongly effervescent; slightly alkaline; gradual wavy boundary.

Bknssyz1—14 to 25 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; weak coarse subangular blocky structure parting to moderate fine and medium angular blocky; extremely hard, very firm; sticky and plastic, common fine and very fine roots; common fine and very fine pores; common distinct slickensides; 15 percent films, threads, and masses of calcium carbonate, gypsum, and other salts; strongly effervescent; moderately saline; slightly alkaline; diffuse wavy boundary.

Bknssyz2—25 to 35 inches; pale brown (10YR 6/3) clay; brown (10YR 5/3) moist; weak coarse subangular blocky structure parting to moderate fine and medium angular blocky; extremely hard, very firm, sticky and plastic few very fine roots; common fine and very fine pores; common faint slickensides; few siliceous pebbles; 17 percent films, threads, and masses of calcium carbonate, gypsum, and other salts; strongly effervescent; strongly saline; slightly alkaline; diffuse wavy boundary.

Bknssyz3—35 to 50 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; weak coarse subangular blocky structure parting to moderate fine and medium angular blocky; extremely hard, very firm, sticky, and plastic, few very fine roots; few fine pores; common distinct slickensides; 10 percent films, threads, and masses of calcium carbonate, gypsum, and other salts; common fine faint yellowish brown (10YR 5/6) masses of iron accumulation; strongly effervescent; strongly saline; slightly alkaline; gradual wavy boundary.

Bknssyz4—50 to 73 inches; very pale brown (10YR 7/4) silty clay, light yellowish brown (10YR 6/4) moist; weak coarse subangular blocky structure; extremely hard, very firm; sticky and plastic, few very fine roots; few very fine pores; common distinct slickensides; 2 percent films, threads and masses of calcium carbonate, gypsum, and other salts; strongly effervescent; moderately saline; slightly alkaline; gradual wavy boundary.

Bknyz—73 to 80 inches; very pale brown (10YR 7/4) clay, light yellowish brown (10YR 6/4) moist; weak medium subangular blocky structure; extremely hard, very firm, sticky, and plastic; 2 percent masses of calcium carbonate, gypsum, and other salts; strongly effervescent; moderately saline; slightly alkaline.

Range in Characteristics

Solum thickness: Greater than 80 inches
Depth to identifiable secondary calcium carbonates: 7 to 25 inches
Depth to slickensides: 3 to 15 inches. COLE ranges from about 0.09 to 0.16. The soil cracks 0.4 to 2 inches wide at the surface when dry and the cracks extend to a depth of 20 inches or more.
Depth to salt accumulations: 3 to 15 inches. Salinity increases with depth in the upper 40 inches. The exchangeable sodium percentage is 15 or more (13 percent or more SAR) in the upper 30 inches of the solum.
Depth to redox concentrations: 20 to 40 inches
Depth to redox depletions: 20 to 40 inches, where present
Clay content: 40 to 60 percent
Coarse fragments: 0 to 10 percent
CEC/clay ratio: Greater than 0.60

A horizon

Hue: 10YR to 5Y
Value: 5 or 6
Chroma: 1 to 4
Texture: Clay or silty clay
Clay content: 35 to 60 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 2 to 15 percent
EC (dS/m): 0 to 8
Gypsum: 0 to 5 percent
SAR: 0 to 30
Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline or moderately alkaline

B horizon

Hue: 10YR to 5Y
Value: 5 to 7
Chroma: 1 to 4
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Redox concentrations: 0 to 5 percent, fine or medium, faint to prominent, on surfaces and interiors of peds
Redox depletions: None to few, fine, faint on surfaces of peds
Coarse fragments: 0 to 10 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 2 to 20 percent
Identifiable secondary carbonate: 2 to 20 percent, fine and medium, mainly concentrated along ped faces and along cracks. They occur in the form of films, threads, concretions, and masses.
EC (dS/m): 4 to 24
Gypsum: 0 to 15 percent
SAR: 13 to 35
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

C horizon (where present)

In some pedons, a C horizon of clay or clay intermingled with soft shale fragments, occurs below 40 inches. Crystalline segregations of salt are few to many.

Clareville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Base slope on draw
Parent material: Loamy alluvial sediments of Holocene age
Slope range: 0 to 1 percent
Associated soils: Colmena, Czar, Pernitas, Premont, and Weesatche
Taxonomic class: Fine smectitic, hyperthermic, Pachic Argiustolls

Typical Pedon

In an area of Czar-Clareville soils, 0 to 1 percent slopes, rarely flooded; in Jim Wells County, Texas; from the intersection of U.S. Highway 281 and Texas Highway 359 in Alice, 16 miles northeast on Texas Highway 359, and 130 yards east of gas pipeline marker and right-of-way marker in cropland; (this point is 1.55 miles southwest of the intersection of Texas Highway 359 and Farm Road 624 in Orange Grove). Orange Grove, Texas USGS topographic quadrangle; Latitude: 27 degrees, 56 minutes, 13.3 seconds North; Longitude: 97 degrees, 56 minutes, 51.6 seconds West; NAD 83.

Ap—0 to 5 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1), moist; weak fine granular structure; hard, friable; slightly sticky; few fine roots; neutral; abrupt smooth boundary.

A—5 to 11 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; weak fine subangular blocky structure; hard, friable; sticky; few fine roots; few fine pores; neutral; clear smooth boundary.

Bt1—11 to 18 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1), moist; moderate fine and medium subangular blocky structure; very hard, firm, sticky; few fine roots; many fine pores; few distinct clay films; slightly alkaline; gradual smooth boundary.

Bt2—18 to 25 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2), moist; moderate medium prismatic structure parting to moderate medium blocky; very hard, firm, sticky; few fine roots; many fine pores; common distinct clay films; few wormcasts; slightly alkaline; gradual wavy boundary.

Btk—25 to 33 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3), moist; moderate medium blocky structure; very hard, very firm, sticky; few fine roots; many fine pores; common distinct clay films; few masses of calcium carbonate; few wormcasts; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bk1—33 to 38 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2), moist; weak medium blocky structure; very hard, very firm, sticky; few fine roots; few fine pores; many wormcasts; few masses and concretions of calcium carbonate; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk2—38 to 46 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; hard, firm, sticky; few fine roots; few fine pores; about 20 percent masses and concretions of calcium carbonate; strongly effervescent; moderately alkaline; gradual smooth boundary.

BCk—46 to 80 inches; very pale brown (10YR 8/3) loam, very pale brown (10YR 7/3) moist; weak coarse subangular blocky structure; hard, friable; few masses and concretions of calcium carbonate; slightly effervescent; moderately alkaline.

Range in Characteristics

Solum thickness: 150 to 203 cm (60 to 80 inches)
Mollic epipedon: 50 to 127 cm (20 to 50 inches)
Depth to secondary calcium carbonate: 61 to 91 cm (24 to 36 inches)
Clay content: 35 to 45 percent

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 3
Texture: Loam, clay loam, or sandy clay loam
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 7.5YR or 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Sandy clay loam, clay loam, sandy clay, or clay
Reaction: Neutral or slightly alkaline

Btk or Bk horizons

Hue: 7.5YR or 10YR
Value: 3 to 6
Chroma: 1 to 4
Texture: Sandy clay loam, clay loam, sandy clay, or clay
Calcium carbonate equivalent: 5 to 30 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

BCk horizon

Hue: 7.5YR or 10YR
Value: 5 to 8
Chroma: 2 to 6
Texture: Loam, clay loam, or sandy clay loam
Calcium carbonate equivalent: 15 to 50 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Colmena Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Remnant paleoterrace
Parent material: Loamy sediments over calcareous loamy alluvium of Quaternary age
Slope range: 0 to 3 percent
Associated soils: Alet, Clareville, Czar, Delfina, Premont, and Weesatche
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Typic Argiustolls

Typical Pedon

Colmena fine sandy loam, 0 to 3 percent slopes; in Kleberg County, Texas; from the intersection of U.S. Highway 77 and Highway 141 in Kingsville, 7.7 miles west on Highway 141, 3.1 miles southwest on ranch road, 2.1 miles south on ranch road, 4.0 miles east on ranch road, and 200 feet south in rangeland. Escondido Lake, Texas USGS topographic quadrangle; Latitude: 27 degrees, 28 minutes, 41.18 seconds North; Longitude: 97 degrees, 56 minutes, 6.70 seconds West; NAD 83.

A1—0 to 6 inches; dark gray (10YR 4/1) fine sandy loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; slightly hard, very friable;

common fine and medium roots; common fine tubular and very fine tubular pores; noneffervescent; neutral; clear smooth boundary.

A2—6 to 11 inches; very dark grayish brown (10YR 3/2) fine sandy loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; hard, very friable; common fine roots; common fine and very fine tubular pores; noneffervescent; neutral; clear smooth boundary.

Bt1—11 to 19 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure; hard, very friable; common fine roots; common very fine, fine, and medium tubular pores; 6 percent distinct very dark grayish brown (10YR 3/2) clay films on all faces of peds; noneffervescent; neutral; gradual smooth boundary.

Bt2—19 to 39 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure; very hard, very friable; common fine and medium roots; common very fine and fine tubular pores; 8 percent distinct brown (10YR 4/3) clay films on all faces of peds; noneffervescent; neutral; abrupt smooth boundary.

2Btk1—39 to 50 inches; variegated matrix with 50 percent light gray (10YR 7/2) and 50 percent light yellowish brown (10YR 6/4) sandy clay loam, brown (10YR 5/3) and grayish brown (10YR 5/2) moist; moderate medium prismatic structure; extremely hard, very friable; common fine roots; common very fine and fine tubular pores; 3 percent faint pale brown (10YR 6/3) clay films on surfaces along pores; 2 percent fine prominent irregular extremely weakly cemented white (7.5YR 8/1) calcium carbonate masses with sharp boundaries in matrix along faces of peds and 10 percent fine prominent irregular extremely weakly cemented white (7.5YR 8/1) calcium carbonate, finely disseminated with sharp boundaries infused in matrix; strong effervescent; slightly alkaline; gradual smooth boundary.

2Btk2—50 to 61 inches; very pale brown (10YR 7/3) sandy clay loam, pale brown (10YR 6/3) moist; moderate medium prismatic structure; extremely hard, very friable; common fine roots; common very fine and fine tubular pores; 3 percent faint light yellowish brown (10YR 6/4) clay films on surfaces along pores; 15 percent fine prominent irregular extremely weakly cemented white (7.5YR 8/1) calcium carbonate masses with sharp boundaries in matrix along faces of peds; violent effervescent; slightly alkaline; gradual smooth boundary.

2Btk3—61 to 80 inches; very pale brown (10YR 7/4) sandy clay loam, pale brown (10YR 6/3) moist; moderate medium prismatic structure; very hard, very friable; common fine roots; common very fine and fine tubular pores; 3 percent faint brownish yellow (10YR 6/6) clay films on surfaces along pores; 20 percent medium prominent irregular extremely weakly cemented white (7.5YR 8/1) calcium carbonate masses with sharp boundaries in matrix along faces of peds and 5 percent coarse prominent irregular weakly cemented white (7.5YR 8/1) calcium carbonate masses with sharp boundaries along faces of peds; violent effervescent; slightly alkaline.

Range in Characteristics

Depth to argillic horizon: 5 to 15 inches
Depth to secondary calcium carbonate: 29 to 65 inches
Clay content: 20 to 32 percent

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 3
Texture: Fine sandy loam
Clay content: 8 to 19 percent
Rock fragments: 0 to 5 percent

Calcium carbonate equivalent: 0 to 5 percent
EC (dS/cm): 0 to 3
SAR: 0 to 4
Effervescence: Noneffervescent
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 1 to 4
Texture: Sandy clay loam or clay loam
Clay content: 20 to 32 percent
Clay films: 4 to 8 percent; faint to distinct; along faces of peds and in matrix;
Redox concentration: 0 to 10 percent; fine and medium; distinct, prominent, and clear; on ped faces and along root channels
Rock fragments: 0 to 5 percent
Calcium carbonate equivalent: 0 to 5 percent
EC (dS/cm): 0 to 3
SAR: 0 to 4
Effervescence: Noneffervescent to slight
Reaction: Neutral to moderately alkaline

2Bk or 2Btk horizon

Hue: 7.5YR or 10YR
Value: 4 to 8
Chroma: 2 to 6
Texture: Loam or sandy clay loam
Clay content: 20 to 32 percent
Clay films: 3 to 5 percent, on surfaces along pores, faint
Calcium carbonate equivalent: 5 to 15 percent
Identifiable secondary carbonates: 2 to 20 percent; threads, masses, and nodules; fine to coarse; infused in matrix and in matrix along faces of peds
EC (dS/m): 0 to 1
SAR: 2 to 4
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Comitas Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Vegetated sandsheet
Parent material: Eolian sands of Holocene age over eolian deposits and/or alluvium of Quaternary age
Slope range: 0 to 5 percent
Associated soils: Brenna, Hebbronville, Nueces, and Sarita
Taxonomic class: Loamy, mixed, active, hyperthermic, Arenic Aridic Paleustalfs

Typical Pedon

Comitas loamy fine sand, 0 to 5 percent slopes; in Jim Hogg County, Texas; from the intersection of Texas Highway 285 and Texas Highway 359 in Hebbronville, 3.15 miles east on Texas Highway 285 to ranch road, 0.65 mile south on ranch road, and 75 feet east of a ranch road in pasture. Hebbronville, Texas USGS topographic quadrangle;

Latitude: 27 degrees, 17 minutes, 15 seconds North; Longitude: 98 degrees, 38 minutes, 06 seconds West; NAD 83.

Ap—0 to 5 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; single-grained; loose, slightly hard, very friable, nonsticky and nonplastic; common fine roots; neutral; abrupt smooth boundary.

A—5 to 31 inches; brown (10YR 4/3) loamy fine sand, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots and pores; neutral; clear smooth boundary.

Bt—31 to 59 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to weak subangular blocky; hard, friable; few roots; few faint clay films on surfaces of prism and lining pores; common fine roots and pores; neutral; gradual smooth boundary.

Btk—59 to 80 inches; reddish yellow (7.5YR 6/6) fine sandy loam, strong brown (7.5YR 5/6) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few distinct clay films on surfaces of peds; 2 percent fine films and threads of calcium carbonate; common fine pores; violently effervescent; moderately alkaline; clear smooth boundary.

Range in Characteristics

Depth to argillic horizon: 20 to 40 inches
Depth to secondary calcium carbonate: 36 to 80 inches
Clay content: 5 to 18 percent
Coarse fragments: 0 to 5 percent
CEC/clay ratio: 0.40 to 0.60

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Loamy fine sand
Clay content: 2 to 12 percent
Base saturation: 80 to 100 percent
Calcium carbonate equivalent: 0 to 1 percent
EC (dS/m): 0 to 2
Effervescence: Noneffervescent
Reaction: Slightly acid or neutral

Bt or Btk horizon

Hue: 5YR to 10YR
Value: 4 to 7
Chroma: 2 to 8
Texture: Fine sandy loam or sandy clay loam
Clay content: 6 to 24 percent
Clay films: Few or common, faint or distinct, on surfaces of peds and lining pores
Base saturation: 75 to 100 percent
Calcium carbonate equivalent: 0 to 5 percent
Identifiable secondary carbonate: 0 to 2 percent, fine or medium, in the form of films and threads
EC (dS/m): 0 to 2
Effervescence: Noneffervescent or slight in the upper part; strong or violent in the lower part
Reaction: Slightly acid to slightly alkaline in the upper part; neutral to moderately alkaline in the lower part

Copita Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Interfluves
Parent material: Calcareous, loamy residuum weathered from sandstone
Slope range: 1 to 5 percent
Associated soils: Brennan, Catarina, Hebbronville, and Tela
Taxonomic class: Fine-loamy, mixed, active, hyperthermic, Aridic Calciustepts

Typical Pedon

Copita sandy clay loam, 1 to 5 percent slopes; in Starr County, Texas; from the intersection of Loma Blanca Road and U.S. Highway 83 (which is 4.0 miles north-northwest of Roma), 1.2 miles north on Loma Blanca Road, and 240 feet west in a rangeland. Roma-Los Saenz West, Texas USGS topographic quadrangle; Latitude: 26 degrees, 28 minutes, 42 seconds North; Longitude: 99 degrees, 1 minute, 40 seconds West; NAD 83.

A1—0 to 2 inches; light brownish gray (10YR 6/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few snail shell fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.

A2—2 to 11 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium and coarse prismatic structure parting to weak fine and medium subangular blocky when dry, massive when moist; hard, friable, slightly sticky, and slightly plastic; common roots; common fine pores; few snail shell fragments; 1 percent films and threads of calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk1—11 to 26 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; moderate medium and coarse prismatic structure parting to weak fine and medium subangular blocky when moist; hard, friable, slightly sticky, and slightly plastic; common roots; common fine pores; few snail shell fragments; 2 percent films and threads of calcium carbonate; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—26 to 37 inches; light yellowish brown (10YR 6/4) sandy clay loam; yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable; few roots; common fine pores; few snail shell fragments; 22 percent films and threads of calcium carbonate; violently effervescent; moderately alkaline; clear wavy boundary.

Crk—37 to 49 inches; very pale brown (10YR 7/3) weakly cemented calcareous sandstone with thin strata and pockets of sandy loam; fractured; brittle; contains a few roots in the sandy loam in crevices; 5 percent calcium carbonate as coatings on upper boundary, and in fractures or partings; violently effervescent; moderately alkaline; gradual wavy boundary.

R—49 to 54 inches; very pale brown (10YR 7/3) strongly cemented calcareous sandstone; contains a few fractures with calcium carbonate coatings; moderately alkaline.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to paralithic or densic contact: 20 to 40 inches
Depth to calcic horizon: 6 to 18 inches
Clay content: 20 to 30 percent

Coarse fragments: 0 to 5 percent
CEC/clay ratio: 0.40 to 0.60

A horizon

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Fine sandy loam or sandy clay loam
Clay content: 14 to 20 percent
Base saturation: 100
Calcium carbonate equivalent: 1 to 10 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
SAR: 0 to 1
Effervescence: Slight or strong
Reaction: Moderately alkaline

Bk horizon

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 20 to 30 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 15 to 35 percent
Identifiable secondary carbonate: 1 to 25 percent, fine to medium, films, threads, and masses on surfaces of peds and as coatings on coarse fragments
EC (dS/m): 2 to 8
Gypsum: 0 to 2 percent
SAR: 0 to 12
Effervescence: Strong or violent
Reaction: Moderately alkaline

Cr layer

Type material: Sandstone bedrock or noncemented sandy densic material that slakes in water
Cementation: Weakly cemented to moderately cemented
Reaction: Moderately alkaline
Other features: The Cr layer can be dug with a spade when moist in some pedons.

R layer

Type material: Sandstone bedrock
Cementation: Strongly cemented

Coy Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Very slow
Landform: Drainageways and footslopes on interfluves
Parent material: Alluvium derived from calcareous mudstone
Slope range: 1 to 3 percent
Associated soils: Annarose, Clareville, Czar, and Weesatche
Taxonomic class: Fine, smectitic, hyperthermic, Pachic Vertic Argiustolls

Typical Pedon

Coy clay loam, 1 to 3 percent slopes; in Wilson County, Texas; from the intersection of U.S. Highway 181 and Texas Highway 97 in Floresville, 4.5 miles south on U.S. Highway 181, 300 feet north of petroleum service station, and 150 feet east in cultivated field (fig. 14). Poth, Texas USGS topographic quadrangle; Latitude: 29 degrees, 6 minutes, 14.1 seconds North; Longitude: 98 degrees, 6 minutes, 6.8 seconds West; NAD 83.

Ap—0 to 6 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; weak fine granular and subangular blocky structure; hard, firm; many fine roots; common wormcasts and insect tunnels; 3 millimeters gray (10YR 6/1) surface crust; very slightly effervescent; moderately alkaline; clear smooth boundary.

Bt1—6 to 12 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; weak coarse prismatic parting structure to moderate fine subangular blocky; hard, firm; many fine roots; many wormcasts and insect tunnels; few clay films on surface of peds; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bt2—12 to 25 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; weak medium prismatic parting to moderate fine blocky structure; very hard, firm; common fine roots; common wormcasts and insect tunnels; common pressure faces; few clay films on surface of peds; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bt3—25 to 40 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate fine and medium blocky structure; very hard, firm; common pressure faces; few clay films on surface of peds; few fine and very fine nodules of calcium carbonate; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk—40 to 54 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; moderate medium blocky structure; very hard, firm; few vertical cracks 6 millimeters wide filled with dark grayish brown (10YR 4/2) clay; common pressure faces; common masses and fine nodules of calcium carbonate; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bky—54 to 80 inches; grayish brown (10YR 5/2) and brownish yellow (10YR 6/6) clay, dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/6) moist; weak medium blocky structure; very hard, firm; few dark grayish brown vertical streaks; few fine nodules of calcium carbonate; common fine crystals of gypsum; few fragments of mudstone; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of mollic epipedon: 20 to 45 inches
Depth to argillic horizon: 4 to 40 inches
Vertic properties: When dry, the soil has cracks up to 2 inches wide at the surface that extend to depths of more than 40 inches.
Depth to calcic horizon: 40 to 80 inches

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Clay loam
Clay content: 25 to 40 percent
Effervescence: Very slight or slight
Reaction: Slightly alkaline or moderately alkaline

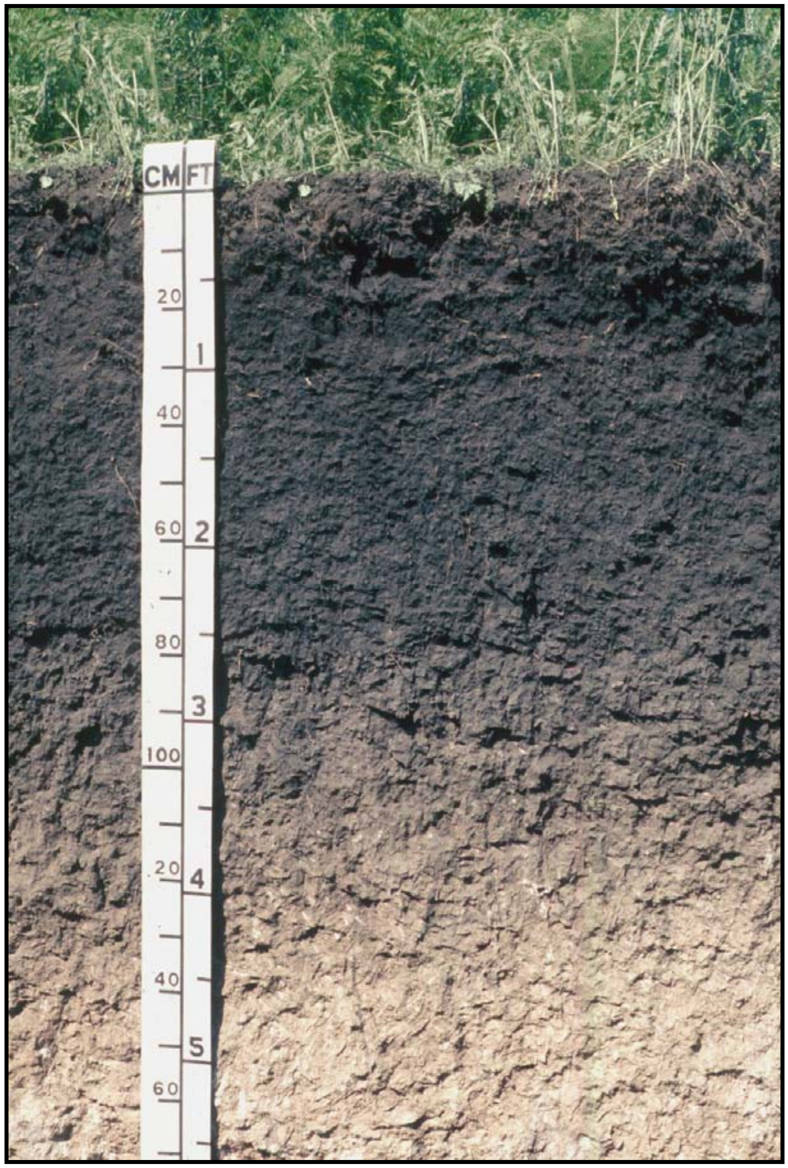

Figure 14.—Profile of Coy clay loam, 1 to 3 percent slopes. The thick, dark-colored surface layer is indicative of high natural fertility. (Scale in cm—centimeters, and ft—feet)

BA horizon (where present)

Hue: 10YR
Value: 2 to 4
Chroma: 1 or 2
Texture: Sandy clay loam, clay loam, or clay
Clay content: 25 to 45 percent
Effervescence: Slight
Reaction: Slightly alkaline or moderately alkaline

Bt horizon

Hue: 10YR
Value: 3 to 6

Chroma: 1 to 4
Texture: Clay loam, sandy clay, or clay
Clay content: 35 to 60 percent
Identifiable secondary calcium carbonate: 0 to 3 percent, masses, threads, and nodules, throughout
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Btk horizon (where present)

Hue: 7.5YR or 10YR
Value: 3 to 6
Chroma: 1 to 4
Texture: Clay loam, sandy clay, or clay
Clay content: 35 to 60 percent
Identifiable secondary calcium carbonate: 3 to 10 percent, masses, threads, and nodules, throughout
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bk or Bky horizons

Hue: 7.5YR or 10YR
Value: 5 to 7
Chroma: 2 to 6
Texture: Silty clay or clay
Clay content: 40 to 60 percent
Identifiable secondary calcium carbonate: 0 to 10 percent, masses and nodules, throughout
Gypsum: 0 to 5 percent, threads and films, throughout
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

BC horizon (where present)

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 6
Texture: Silty clay or clay
Clay content: 40 to 60 percent
Identifiable secondary calcium carbonate: 1 to 15 percent, masses, films, and nodules, throughout
Gypsum: 0 to 10 percent, threads and films, throughout
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

Cuevitas Series

Depth class: Very shallow and shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Ridges and interfluves
Parent material: Noncalcareous, loamy alluvium over petrocalcic derived from calcareous loamy alluvium of Miocene-Pliocene age
Slope range: 1 to 5 percent
Associated soils: Delmita, Piedras, and Randado
Taxonomic class: Loamy, mixed, active, hyperthermic, shallow, Aridic Haplustepts

Typical Pedon

In an area of Piedras and Cuevitas soils, 1 to 5 percent slopes; in Jim Hogg County, Texas; from the intersection of Texas Highway 16 and Texas Highway 285 in Hebbronville, 1.5 miles south on Texas Highway 16 to Farm Road 3073, 14.5 miles west on Farm Road 3073 to caliche road, 200 feet south on caliche road, and 50 feet west in rangeland. Thompsonville, Texas USGS topographic quadrangle; Latitude: 27 degrees, 14 minutes, 11.2 seconds North; Longitude: 98 degrees, 55 minutes, 5 seconds West; NAD 83.

A1—0 to 1 inch; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; neutral; abrupt smooth boundary.

A2—1 to 9 inches; reddish brown (5YR 4/3) fine sandy loam, dark reddish brown (5YR 3/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine pores; neutral; abrupt wavy boundary.

Bkkm1—9 to 16 inches; very pale brown (10YR 8/2) strongly cemented calcium carbonate; laminar cap is 4 inches thick; violently effervescent; moderately alkaline; clear smooth boundary.

Bkkm2—16 to 80 inches; very pale brown (10YR 8/2) weakly cemented calcium carbonate; apparent field texture is fine sandy loam, or loam; violently effervescent; moderately alkaline.

Range in Characteristics

Depth to petrocalcic horizon: 4 to 20 inches
Clay content: 12 to 18 percent
Coarse fragments: 0 to 15 percent siliceous gravel and indurated calcrete fragments

A horizon

Hue: 5YR or 7.5YR
Value: 4 or 5
Chroma: 2 to 6
Texture: Fine sandy loam or loam
Pararock fragments: 0 to 5 percent
Base saturation: 100 percent
EC (dS/m): 0 to 1
Gypsum: 0 to 1 percent
Effervescence: Noneffervescent
Reaction: Neutral or slightly alkaline

Bkkm1 horizon

Hue: 10YR
Value: 7 or 8
Chroma: 2 or 3
Base saturation: 100 percent
Cementation: Moderately or strongly cemented
Calcium carbonate equivalent: 60 to 80 percent
Laminar cap: Moderately cemented to indurated in the upper 1 to 4 inches
Effervescence: Violent
Reaction: Moderately alkaline

Bkkm2 horizon

Hue: 10YR
Value: 7 or 8
Chroma: 2 or 3

Coarse fragments: 0 to 10 percent strongly cemented or indurated calcrete
Pararock fragments: 0 to 10 percent
Base saturation: 100 percent
Cementation: Weakly or moderately cemented
Calcium carbonate equivalent: 50 to 80 percent
Effervescence: Violent
Reaction: Moderately alkaline

Czar Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Drainageways
Parent material: Loamy alluvium of Holocene age over loamy alluvium of Quaternary age
Slope range: 0 to 1 percent
Associated soils: Colmena, Clareville, Pernitas, Premont, and Weesatche
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Pachic Argiustolls

Typical Pedon

In an area of Czar-Clareville soils, 0 to 1 percent slopes, rarely flooded; in Kleberg County, Texas; from the intersection of U.S. Business Highway 77 and Texas Highway 141 in Kingsville, 14.85 miles south on Highway 77, 6.4 miles west on ranch road, 6.3 miles north on ranch road, and 0.2 mile west in rangeland. Escondido Lake, Texas USGS topographic quadrangle; Latitude: 27 degrees, 23 minutes, 48.20 seconds North; Longitude: 97 degrees, 57 minutes, 19.90 seconds West; NAD 83.

A—0 to 7 inches; very dark grayish brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine and medium granular structure; hard, friable; common fine and many medium roots; many fine tubular pores; noneffervescent; moderately acid; abrupt smooth boundary.

Bt1—7 to 13 inches; very dark grayish brown (10YR 3/2) sandy clay loam, black (10YR 2/1) moist; moderate coarse subangular blocky structure; very hard, firm; common fine, very fine, and medium roots; many fine tubular pores; 3 percent faint clay films on faces of peds; noneffervescent; neutral; clear smooth boundary.

Bt2—13 to 27 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; very hard, friable; common fine, medium, and many very fine roots; many fine and common medium tubular pores; 12 percent distinct clay films on faces of peds; noneffervescent; neutral; gradual smooth boundary.

Bt3—27 to 40 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm; common fine and medium roots; common fine and very fine irregular pores; 35 percent distinct very dark brown (10YR 2/2) clay films on faces of peds; noneffervescent; slightly alkaline; gradual wavy boundary.

Bt4—40 to 61 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, friable; common fine and coarse roots; many fine tubular pores; 7 percent faint clay films on faces of peds; noneffervescent; slightly alkaline; clear smooth boundary.

2Btk1—61 to 69 inches; very pale brown (10YR 7/4) sandy clay loam, light yellowish brown (10YR 6/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable; common fine and coarse roots; many fine, very fine, and common medium tubular pores; 2 percent faint clay films on faces of peds; 20 percent fine distinct dendritic white (10YR 8/1) finely disseminated

carbonates infused into matrix along faces of peds and 5 percent medium prominent irregular white (10YR 8/1) carbonate masses infused into matrix along faces of peds; violently effervescent; strongly alkaline; clear smooth boundary.

2Btk2—69 to 80 inches; very pale brown (10YR 8/4) sandy clay loam, very pale brown (10YR 7/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, friable; common fine and coarse roots; common fine and medium tubular pores; 1 percent faint clay films on faces of peds; 25 percent fine distinct dendritic white (10YR 8/1) finely disseminated carbonates infused into matrix along faces of peds and 15 percent medium prominent irregular white (10YR 8/1) carbonate masses infused into matrix along faces of peds and 15 percent coarse prominent irregular white (10YR 8/1) carbonate masses infused into matrix along faces of peds; violently effervescent; strongly alkaline.

Range in Characteristics

Solum thickness: Greater than 80 inches
Depth to secondary carbonates: 36 to 80 inches
Thickness of the mollic epipedon: 20 to 30 inches
Other features: Some pedons have a loamy fine sand overburden less than 6 inches thick

A horizon

Hue: 10YR
Value: 2 to 4
Chroma: 1 to 3
Texture: Fine sandy loam
Effervescence: Noneffervescent
Reaction: Moderately acid to slightly alkaline

Bt horizon

Hue: 7.5YR or 10YR
Value: 3 to 6
Chroma: 1 to 4
Texture: Fine sandy loam or sandy clay loam
Clay content: 18 to 28 percent
Effervescence: Noneffervescent
Reaction: Neutral to moderately alkaline

Btk horizon (where present)

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 6
Texture: Sandy clay loam
Clay content: 20 to 28 percent
Identifiable secondary carbonates: 1 to 12 percent; threads, masses, and nodules; fine; infused in matrix and throughout
Effervescence: Noneffervescent to slight
Reaction: Neutral to moderately alkaline

2Btk horizon

Hue: 7.5YR to 2.5Y
Value: 4 to 8
Chroma: 2 to 6
Texture: Sandy clay loam
Clay content: 20 to 28 percent

Identifiable secondary carbonates: 5 to 15 percent; threads, masses, and nodules; fine or medium; infused in matrix and throughout
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

Delfina Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Paleoterrace or vegetated sandsheet
Parent material: Eolian sands over eolian deposits or alluvium of Quaternary age
Slope range: 0 to 3 percent
Associated soils: Colmena, Clareville, Czar, Nueces, and Premont
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Typic Paleustalfs

Typical Pedon

Delfina fine sandy loam, 0 to 2 percent slopes; in Jim Wells County, Texas; from the intersection of U.S. Highway 281 and U.S. Highway 44 in Alice, 8.7 miles south on U.S. Highway 281, 3.8 miles east on Farm Road 2508, and 250 feet south in cropland (fig. 15). Alice South, Texas USGS topographic quadrangle; Latitude: 27 degrees, 38 minutes, 40.00 seconds North; Longitude: 98 degrees, 1 minute, 30.00 seconds West; NAD 83.

Ap—0 to 10 inches; brown (7.5YR 5/2) fine sandy loam, brown (7.5YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; common fine roots; common fine tubular pores; slightly acid; clear smooth boundary.
A—10 to 16 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; common fine and medium roots; common fine and medium tubular pores; neutral; abrupt smooth boundary.
2Bt1—16 to 21 inches; brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate coarse prismatic structure parting to moderate medium angular blocky; extremely hard, firm; common fine roots; common fine and medium tubular pores; 20 percent distinct brown (7.5YR 4/2) clay films on faces of peds; 1 percent fine faint reddish brown (5YR 5/4) masses of oxidized iron with sharp boundaries in matrix; neutral; clear smooth boundary.
2Bt2—21 to 34 inches; brown (7.5YR 5/2) sandy clay loam, brown (7.5YR 4/2) moist; strong coarse prismatic structure parting to moderate medium subangular blocky; extremely hard, firm; few fine roots; few fine tubular pores; 22 percent distinct brown (7.5YR 4/2) clay films on faces of peds; 1 percent fine faint reddish brown (5YR 5/4) masses of oxidized iron with sharp boundaries in matrix; 1 percent fine masses of calcium carbonate; moderately alkaline; gradual smooth boundary.
2Btk1—34 to 50 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; strong coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm; common fine roots; common fine tubular pores; 15 percent distinct brown (7.5YR 4/2) clay films on faces of peds; 11 percent medium distinct reddish brown (5YR 5/4) masses of oxidized iron with sharp boundaries in matrix; 11 percent medium prominent light olive brown (2.5Y 5/6) masses of iron depletions with sharp boundaries in matrix; 11 percent fine masses of calcium carbonate; slightly effervescent; moderately alkaline; clear wavy boundary.
2Btk2—50 to 65 inches; pink (7.5YR 7/4) sandy clay loam, light brown (7.5YR 6/4) moist; strong coarse prismatic structure parting to moderate medium subangular blocky; hard, friable; few fine roots; common fine tubular pores; 8 percent distinct brown

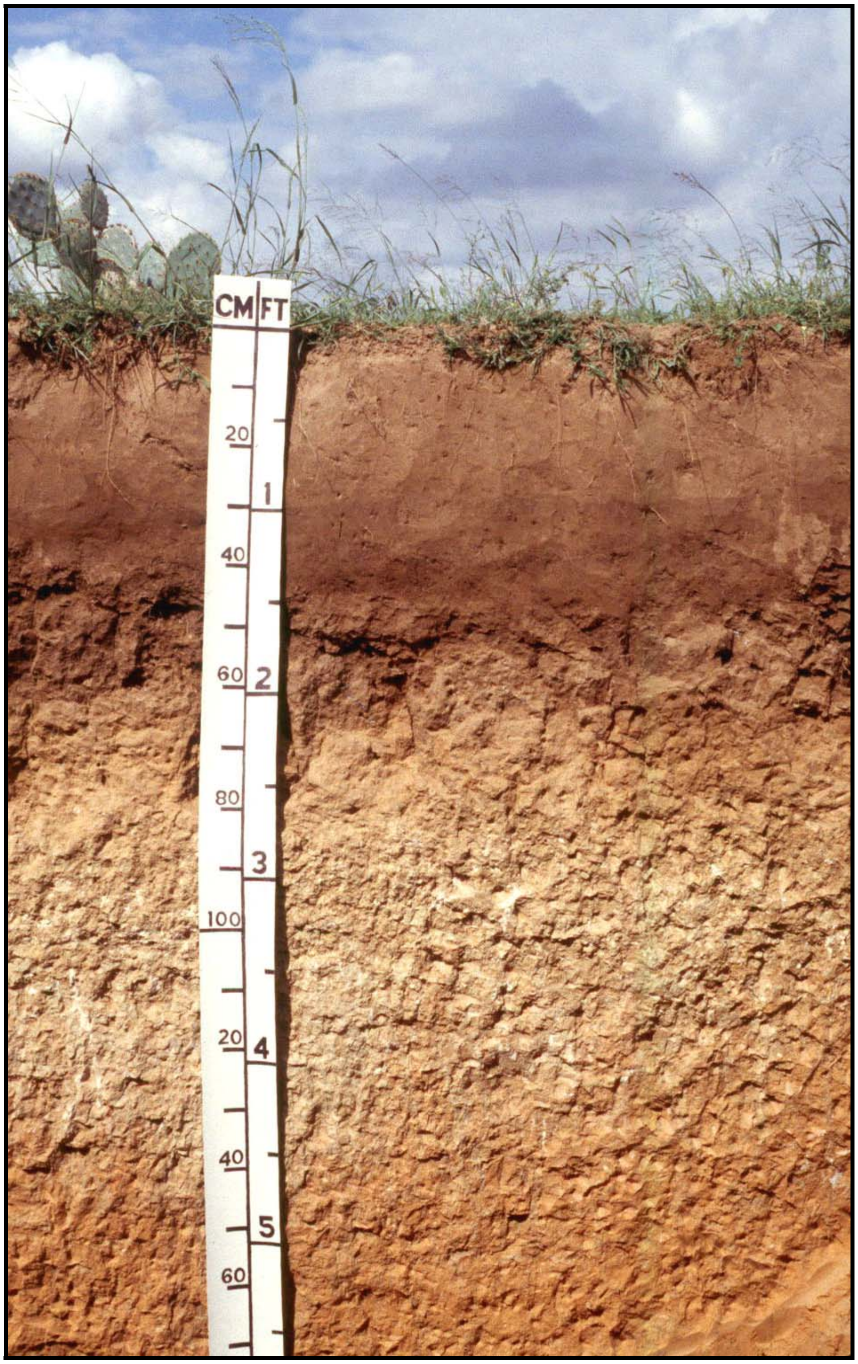

Figure 15.—Profile of Delfina loamy fine sand, 0 to 3 percent slopes. The sandy surface layer ranges from about 8 to 18 inches (20 to 45 cm) in thickness. The contact of the sandy surface layer and the clayey subsoil provides a sharp contrast. (Scale in cm—centimeters, and ft—feet)

(7.5YR 4/2) clay films on faces of peds; 1 percent fine distinct reddish brown (5YR 5/4) masses of oxidized iron with sharp boundaries in matrix; 11 percent coarse prominent light olive brown (2.5Y 5/6) masses of iron depletions with sharp boundaries in matrix; 11 percent fine masses of calcium carbonate; slightly effervescent; strongly alkaline; gradual smooth boundary.

2Btk3—65 to 80 inches; reddish yellow (7.5YR 7/6) sandy clay loam, light brown (7.5YR 6/4) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, friable; few fine roots; common fine tubular pores; 3 percent distinct brown (7.5YR 4/2) clay films on faces of peds; 1 percent fine distinct reddish brown (5YR 5/4) masses of oxidized iron with sharp boundaries in matrix; 1 percent fine prominent light olive brown (2.5Y 5/6) masses of iron depletions with sharp boundaries in matrix; 1 percent fine masses of calcium carbonate; slightly effervescent; moderately alkaline.

Range in Characteristics

Depth to secondary carbonates: 30 to 50 inches
Clay content: 25 to 35 percent

A horizon

Hue: 7.5YR or 10YR
Value: 4 or 5
Chroma: 2 to 4
Texture: Loamy fine sand or fine sandy loam
EC (dS/m): 0 to 2
SAR: 0 to 4
Reaction: Slightly acid or neutral

2Bt horizon

Hue: 5YR to 10YR
Value: 4 to 6
Chroma: 2 to 6
Texture: Sandy clay loam or clay loam
Clay content: 25 to 35 percent
Clay films: 7 to 25 percent; on surface of peds; faint or distinct
Redox concentrations: Few to common; fine or medium; faint or distinct; sharp
EC (dS/m): 0 to 5
SAR: 0 to 8
Effervescence: Noneffervescent to slight
Reaction: Slightly acid to slightly alkaline

2Btk horizon

Hue: 5YR to 10YR
Value: 5 to 7
Chroma: 3 to 6
Texture: Fine sandy loam or sandy clay loam
Clay content: 25 to 35 percent
Clay films: On surface of peds; faint or distinct
Redox concentrations: Few to common; fine or medium; faint or distinct; sharp
Redox depletions: None to few; fine to medium; faint to distinct; sharp
Calcium carbonate equivalent: 5 to 12 percent
Identifiable secondary carbonate: Few to common; fine to medium; in matrix to about 5 percent
EC (dS/m): 0 to 5
SAR: 0 to 8
Effervescence: Slight or strong
Reaction: Slightly alkaline to strongly alkaline

Delmita Series

Depth class: Moderately deep
Drainage class: Well drained

Permeability: Moderate
Landform: Interfluves
Parent material: Noncalcareous loamy alluvium over petrocalcic derived from calcareous loamy alluvium
Slope range: 0 to 3 percent
Associated soils: Cuevitas, Piedras, Randado, and Weesatche
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Petrocalcic Paleustalfs

Typical Pedon

Delmita, fine sandy loam, 0 to 3 percent slopes; in Starr County, Texas; 5.5 miles east of LaGloria on Farm Road 1017, 1,800 feet south on Farm Road 2294, and 150 feet west in rangeland. San Isidro, Texas USGS topographic quadrangle; Latitude: 26 degrees, 42 minutes, 26 seconds North; Longitude: 98 degrees 26 minutes, 6 seconds West; NAD 83.

A—0 to 14 inches; reddish brown (5YR 5/4) fine sandy loam; reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard; friable, slightly sticky and slightly plastic; common fine roots and pores; neutral; clear smooth boundary.
Bt—14 to 30 inches; red (2.5YR 4/6) sandy clay loam; dark red (2.5YR 3/6) moist; moderate coarse prismatic structure parting to weak fine subangular blocky; very hard, friable, sticky, and slightly plastic; few fine roots; few fine pores; few faint clay films on surfaces of peds and lining pores; neutral; abrupt wavy boundary.
Bkkm—30 to 80 inches; very pale brown (10YR 8/2) strongly cemented calcium carbonate, becoming less cemented and massive with depth; indurated laminar cap in the upper part; violently effervescent; moderately alkaline.

Range in Characteristics

Depth to argillic horizon: 9 to 20 inches
Depth to petrocalcic horizon: 20 to 40 inches
Clay content: 18 to 30 percent
Coarse fragments: 0 to 5 percent
CEC/clay ratio: 0.40 to 0.60

A horizon

Hue: 2.5YR to 7.5YR
Value: 4 to 6
Chroma: 4 or 6
Texture: Fine sandy loam
Clay content: 5 to 18 percent
Base saturation: 75 to 100 percent
Calcium carbonate equivalent: 0 to 2 percent
Effervescence: Noneffervescent
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 2.5YR or 5YR
Value: 4 to 6
Chroma: 4 or 6
Texture: Fine sandy loam or sandy clay loam
Clay content: 18 to 30 percent
Clay films: Few or common, faint or distinct, on surfaces of peds and lining pores.
Redox concentrations: A few redox features that are red and brown occur in the lower depths of some pedons.
Base saturation: 100 percent
Calcium carbonate equivalent: 0 to 2 percent

Effervescence: Noneffervescent to slight
Reaction: Neutral or slightly alkaline

Bkkm horizon

Hue: 10YR
Value: 8
Chroma: 1 or 2
Cementation: Strongly cemented calcium carbonate (petrocalcic), becomes less cemented with depth.
Calcium carbonate equivalent: 40 to 80 percent
Effervescence: Violent
Reaction: Slightly alkaline or moderately alkaline

Gertrudis Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Terrace remnant
Parent material: Calcareous, loamy alluvium
Slope range: 0 to 3 percent
Associated soils: Alet, Colmena, Clareville, Czar, Pernitas, and Weesatche
Taxonomic class: Fine-loamy, mixed, active, hyperthermic, Typic Calciustolls

Typical Pedon

Gertrudis fine sandy loam, 0 to 3 percent slopes; in Kleberg County, Texas; from the intersection of Texas State Highway 141 and U.S. Highway 77 in Kingsville, 9.05 miles west on State Highway 141 to ranch road, 0.85 mile north on ranch road, 1.61 miles northwest on ranch road, 0.9 mile south on ranch road, and 100 feet east in rangeland. Kingsville West, Texas USGS topographic quadrangle; Latitude: 27 degrees, 32 minutes, 58.30 seconds North; Longitude: 97 degrees, 59 minutes, 54.3 seconds West; NAD 83.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; moderately hard, friable; many fine and common medium roots; many fine and medium tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

A2—7 to 17 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable; many fine and common medium roots; many fine and common medium tubular pores; 3 percent fine faint threadlike white (10YR 8/1) calcium carbonate masses; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—17 to 25 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine and medium prismatic structure parting to weak fine subangular blocky; slightly hard, friable; common very fine and fine roots; common fine and very fine tubular pores; 3 percent fine faint threadlike white (10YR 8/1) calcium carbonate masses, and 1 percent medium distinct white (10YR 8/1) calcium carbonate masses; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—25 to 41 inches; light brownish gray (10YR 6/2) sandy clay loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure parting to weak fine and medium subangular blocky; slightly hard, friable; common fine roots; common fine tubular pores, 5 percent fine faint threadlike white (10YR 8/1) calcium carbonate masses, and 2 percent fine distinct white (10YR 8/1) calcium carbonate masses; strongly effervescent; moderately alkaline; clear smooth boundary.

2Bk1—41 to 50 inches; pale brown (10YR 6/3) clay loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable; common fine roots; common fine tubular pores; 8 percent fine faint white (10YR 8/1) calcium carbonate masses; strongly effervescent; moderately alkaline; clear smooth boundary.

2Bk2—50 to 68 inches; light gray (10YR 7/2) clay loam, pale brown (10YR 6/3) moist; weak fine and medium subangular blocky structure; moderately hard, friable; common fine and medium roots; common fine and medium tubular pores; 4 percent fine faint white (10YR 8/1) calcium carbonate finely disseminated throughout; 8 percent medium distinct irregular white (10YR 8/1) calcium carbonate masses; and 6 percent coarse prominent white (10YR 8/1) calcium carbonate masses; violently effervescent; moderately alkaline; clear smooth boundary.

2Bk3—68 to 80 inches; light gray (10YR 7/2) loam, light brownish gray (10YR 6/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable; 3 percent fine distinct irregular white (10YR 8/1) calcium carbonate masses, 7 percent fine faint white (10YR 8/1) calcium carbonate finely disseminated throughout, and 15 percent coarse prominent white (10YR 8/1) calcium carbonate masses; violently effervescent; moderately alkaline.

Range in Characteristics

Depth to secondary calcium carbonates: 6 to 17 inches
Clay content: 19 to 27 percent

A horizon

Hue: 10YR
Value: 2 to 5
Chroma: 2
Texture: Fine sandy loam or loam
Clay content: 14 to 17 percent
EC (dS/cm): 0 to 1
SAR: 0 to 1
Effervescence: Slight or strong
Reaction: Neutral to moderately alkaline

Bk horizon

Hue: 10YR or 2.5Y
Value: 3 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Clay content: 15 to 32 percent
Identifiable secondary carbonates: 2 to 25 percent; fine and medium; finely disseminated, irregular threadlike and masses; throughout
EC (dS/cm): 0 to 1
SAR: 0 to 2
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

2Bk horizon (or 2BCk horizon where present)

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 17 to 32 percent

Identifiable secondary carbonates: 2 to 25 percent; fine, medium, and coarse; finely disseminated, irregular threadlike, and masses; throughout
EC (dS/cm): 0 to 1
SAR: 0 to 2
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Grava Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Interfluves
Parent material: Residuum derived from gravelly alluvium
Slope range: 1 to 8 percent
Associated soils: Benavides, Cuevitas, Delmita, Olmedo, Piedras, and Randado
Taxonomic class: Clayey-skeletal, smectitic, hyperthermic, Petrocalcic Paleustolls

Typical Pedon

Grava soils, 1 to 8 percent slopes; in Duval County, Texas; from the intersection of Texas Highway 359 and Farm Road 2295 in Benavides 15.5 miles west on Farm Road 2295, 3.0 miles north on Texas Highway 16, 2.7 miles east on private ranch road, and 100 feet west in rangeland (fig. 16). Parilla Creek NW, Texas USGS topographic quadrangle; Latitude: 27 degrees, 37 minutes, 44 seconds North; Longitude: 98 degrees, 38 minutes, 14 seconds West; NAD 83.

A—0 to 5 inches; reddish brown (5YR 4/3) very gravelly sandy clay loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure parting to weak fine and medium granular; hard, firm slightly sticky and slightly plastic; few medium and coarse roots; 40 percent rounded siliceous pebbles 1/2 to 2 inches in diameter; common interstitial pores; neutral; clear smooth boundary.

Bt1—5 to 18 inches; dark reddish brown (2.5YR 3/4) extremely gravelly clay, dark reddish brown (2.5YR 3/3) moist; moderate coarse prismatic structure parting to moderate medium and coarse angular blocky; very hard, very firm; sticky and plastic; few medium and coarse roots; common distinct clay films on surfaces of peds and pebbles; 75 percent rounded siliceous pebbles 1/2 to 2 inches in diameter; neutral; clear wavy boundary.

Bt2—18 to 27 inches; reddish brown (2.5YR 4/4) extremely gravelly clay, dark reddish brown (2.5YR 3/4) moist; moderate coarse prismatic structure parting to moderate medium and coarse angular blocky; very hard, very firm, very sticky and very plastic; few medium roots; common distinct clay films on surfaces of peds and pebbles; 75 percent siliceous pebbles 1/2 to 2 inches in diameter; neutral; abrupt wavy boundary.

Bk—27 to 30 inches; reddish yellow (5YR 6/6) very gravelly clay loam, yellowish red (5YR 5/6) moist; weak medium and coarse subangular blocky structure parting to weak fine and medium angular and subangular blocky; very hard, very firm, slightly sticky and slightly plastic; few very fine and coarse roots; 40 percent siliceous pebbles and angular fragments of indurated calcrete 1/2 to 2 inches in diameter; violently effervescent; moderately alkaline; abrupt smooth boundary.

Bkkm1—30 to 39 inches; pinkish white (5YR 8/2) strongly cemented calcium carbonate, pink (5YR 8/3) moist; 40 percent siliceous pebbles cemented in the matrix; violently effervescent; moderately alkaline; abrupt smooth boundary.

Bkkm2—39 to 80 inches; pink (5YR 8/3) weakly cemented calcium carbonate, pink (5YR 8/4) moist; approximately 40 percent siliceous pebbles imbedded in the matrix; approximately 8 percent concretions of calcium carbonate less than 3 mm in diameter; violently effervescent; moderately alkaline.

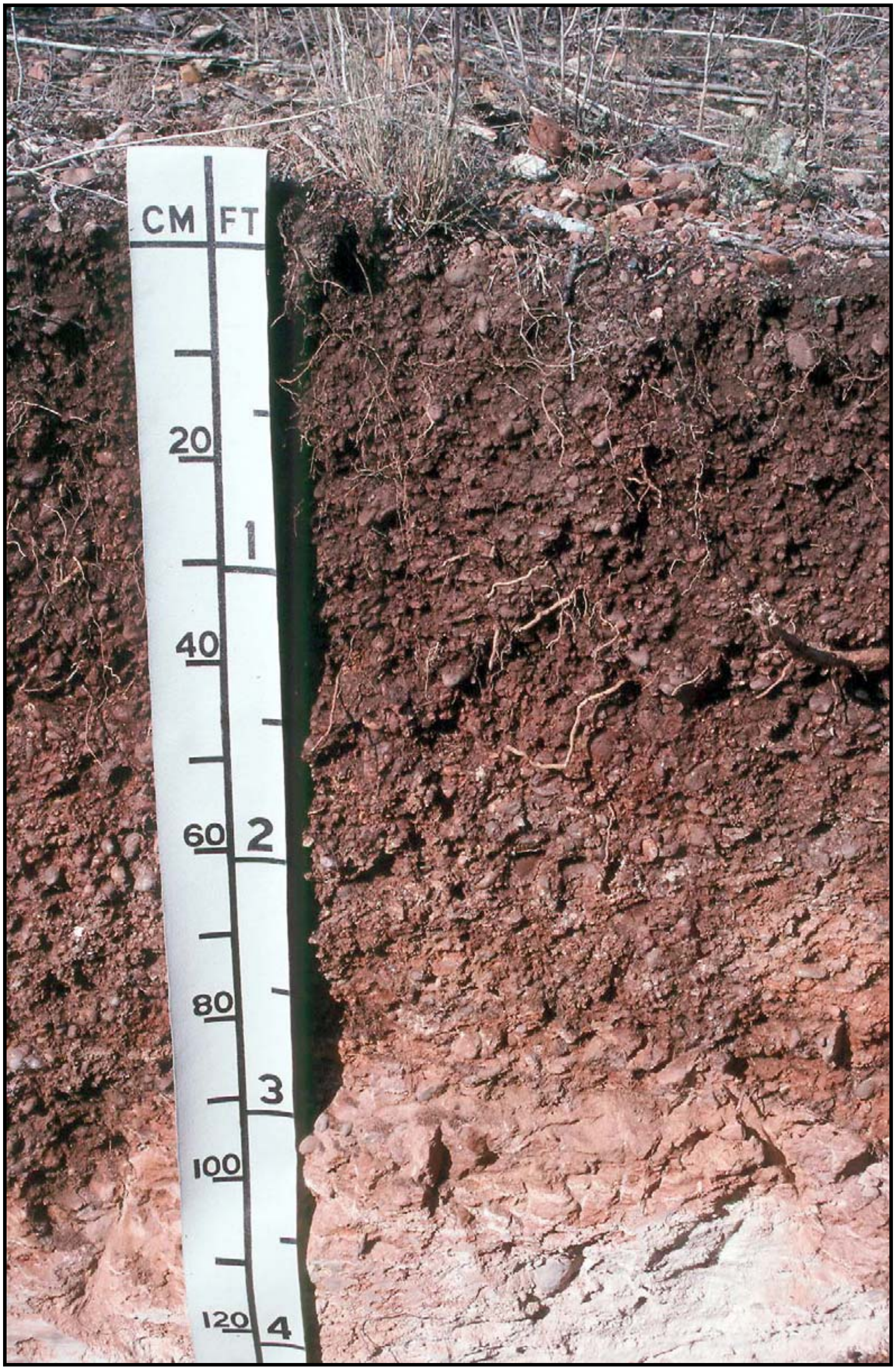

Figure 16.—Profile of Grava soils, 1 to 8 percent slopes. Siliceous gravels dominate the soil profile. This soil is suited to wildlife habitat and carefully managed livestock grazing. (Scale in cm—centimeters, and ft—feet)

Range in Characteristics

Depth to argillic horizon: 4 to 8 inches
Depth to petrocalcic horizon: 20 to 40 inches
Clay content: 40 to 60 percent
Coarse fragments: 35 to 80 percent, and increase with depth

A horizon

Hue: 5YR or 7.5YR
Value: 3 to 5
Chroma: 2 or 3
Texture: Very gravelly sandy clay loam
Clay content: 20 to 30 percent
Coarse fragments: 15 to 60 percent siliceous gravel
Base saturation: 75 to 90 percent
Calcium carbonate equivalent: 0 to 2 percent
EC (dS/m): 0 to 1
Gypsum: 0 to 1 percent
SAR: 0 to 1
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 2.5YR to 7.5YR
Value: 3 to 6
Chroma: 3 to 6
Texture: Gravelly clay, very gravelly clay, or extremely gravelly clay
Clay content: 40 to 65 percent
Coarse fragments: 35 to 80 percent, siliceous gravel
Base saturation: 85 to 95 percent
Calcium carbonate equivalent: 0 to 2 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
SAR: 0 to 1
Reaction: Slightly acid or neutral

Bk horizon (where present)

Hue: 2.5YR to 7.5YR
Value: 3 to 6
Chroma: 4 to 6
Texture: Gravelly clay loam, very gravelly clay loam, extremely gravelly clay loam, gravelly clay, very gravelly clay, or extremely gravelly clay
Clay content: 27 to 45 percent
Coarse fragments: 35 to 80 percent, siliceous gravel
Base saturation: 90 to 100 percent
Calcium carbonate equivalent: 30 to 55 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
SAR: 0 to 1
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Bkkm horizon

Petrocalcic feature: Strongly cemented with a laminar cap from 1 to 2 inches thick over moderately cemented gravelly or very gravelly secondary calcium carbonate that becomes less cemented with depth.

Hue: 10YR
Value: 5 to 8
Chroma: 2 to 6
Coarse fragments: 35 to 60 percent gravel and 5 to 10 percent stones imbedded in matrix
Base saturation: 100 percent
Calcium carbonate equivalent: 40 to 80 percent
EC (dS/m): 0 to 1
Gypsum: 0 to 1 percent
SAR: 0 to 1
Effervescence: Violent
Reaction: Moderately alkaline

Hebbronville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Vegetated sandsheet
Parent material: Eolian sands over calcareous loamy alluvium
Slope range: 1 to 3 percent
Associated soils: Brennan, Copita, and Tela
Taxonomic class: Coarse-loamy, mixed, active, hyperthermic, Aridic Haplustalfs

Typical Pedon

Hebbronville fine sandy loam, 1 to 3 percent slopes; in Duval County, Texas; from the intersection of Texas Highway 16 and U.S. Highway 59 in Freer, 10.25 miles west on U.S. Highway 59, 4.3 miles north on ranch road, and 2,300 feet east in rangeland. Biel Lake NE, Texas USGS topographic quadrangle; Latitude: 27 degrees, 53 minute, 6 seconds North; Longitude: 98 degrees, 46 minutes, 1.00 seconds West; NAD 27.

A—0 to 5 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3), moist; weak fine subangular blocky structure; very friable, soft, nonsticky, nonplastic; many very fine and fine, and common medium roots; common very fine and fine low-continuity vesicular pores; noneffervescent; neutral; clear smooth boundary.

Bt—5 to 21 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 5/3), moist; weak fine and medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; many very fine and fine, and common medium roots; common very fine and fine low-continuity vesicular pores; 30 percent faint clay bridges between sand grains; slightly effervescent; neutral; gradual smooth boundary.

Btk1—21 to 40 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4), moist; weak fine and medium subangular blocky structure; firm, moderately hard, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine low-continuity vesicular pores; 10 percent faint clay bridges between sand grains; 2 percent fine irregular carbonate masses; strongly effervescent; slightly alkaline; gradual smooth boundary.

Btk2—40 to 51 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4), moist; weak fine subangular blocky structure; firm, hard, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine low-continuity vesicular pores; 7 percent faint clay bridges between sand grains; 10 percent fine and medium irregular carbonate masses; violently effervescent; moderately alkaline; clear smooth boundary.

Bk—51 to 65 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3), moist; weak fine subangular blocky structure; friable, moderately hard, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine low-continuity

vesicular pores; 10 percent fine and medium irregular carbonate masses; violently effervescent; moderately alkaline; gradual wavy boundary.

BCk—65 to 80 inches; very pale brown (10YR 7/3) fine sandy loam, pale brown (10YR 6/3), moist; single grain; friable, moderately hard, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine low-continuity vesicular pores; 3 percent fine irregular carbonate masses; strongly effervescent; moderately alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Depth to secondary carbonates: 14 to 60 inches

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 or 3
Texture: Loamy fine sand
Reaction: Neutral or slightly alkaline

Bt and Btk horizons

Hue: 7.5YR or 10YR
Value: 5 or 6
Chroma: 2 to 4
Texture: Fine sandy loam or loam
Identifiable secondary carbonates: 1 to 3 percent masses
Clay content: 12 to 18 percent
Effervescence: Noneffervescent to strong
Reaction: Neutral to moderately alkaline

Bk and BCk horizons

Hue: 10YR
Value: 6 or 7
Chroma: 3 to 6
Texture: Fine sandy loam, sandy clay loam, or loam
Identifiable secondary carbonates: 1 to 14 percent masses
Effervescence: Strong or violent
Reaction: Slightly alkaline to strongly alkaline

Houla Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Broad flats on erosion remnants
Parent material: Loamy, calcareous, tuffaceous sediments of the Catahoula Formation
Slope range: 0 to 3 percent
Associated soils: Lomart, Mirasol, Salco, and Tela
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Aridic Calciustolls

Typical Pedon

Houla clay loam, 0 to 3 percent; in Duval County, Texas; from the intersection of U.S. Highway 59 and Texas State Highway 44 east of Freer, 200 feet north on U.S. Highway 59, and 100 feet east in rangeland. Freer North, Texas USGS topographic quadrangle;

Latitude: 27 degrees, 53 minutes, 2 seconds North; Longitude: 98 degrees, 35 minutes, 40 seconds West; NAD 83.

A1—0 to 7 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable; few fine roots; common fine and very fine pores; few broken snail shell fragments; few insect tunnels; strong effervescent; moderately alkaline; gradual smooth boundary.

A2—7 to 16 inches; brown (10YR 5/3) silty clay, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, friable; few fine roots; common fine and very fine pores; few broken snail shell fragments; few insect tunnels; 11 percent calcium carbonate equivalent; strong effervescent; moderately alkaline; diffuse smooth boundary.

Bk1—16 to 32 inches; very pale brown (10YR 7/4) silty clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; hard, friable; common fine and very fine pores; 5 percent fine films and threads of calcium carbonate; 20 percent calcium carbonate equivalent; violent effervescent; moderately alkaline; diffuse smooth boundary.

Bk2—32 to 51 inches; very pale brown (10YR 8/4) loam, light yellowish brown (10YR 6/4) moist; structureless; very hard, firm; common fine and very fine pores; 10 percent fine films and threads of calcium carbonate; 24 percent calcium carbonate equivalent; violent effervescent; slightly alkaline; diffuse smooth boundary.

Bk3—51 to 80 inches; very pale brown (10YR 8/4) silt loam, light yellowish brown (10YR 6/4) moist; structureless; very hard, firm; common fine and very fine pores; about 3 percent by volume films and threads of calcium carbonate; 11 percent calcium carbonate equivalent; violent effervescent; moderately alkaline.

Range in Characteristics

Solum thickness: More than 60 inches
Depth to calcic horizon: 7 to 24 inches
Coarse fragments: 0 to 5 percent gravel

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Loam, sandy clay loam, clay loam, silty clay loam, or silty clay
Calcium carbonate equivalent: 2 to 15 percent
EC (dS/cm): 0 to 1
SAR: 0 to 1
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 7.5YR or 10YR
Value: 5 to 8
Chroma: 2 to 4
Texture: Silt loam, loam, clay loam, silty clay loam, or silty clay
Calcium carbonate equivalent: 5 to 30 percent
Identifiable secondary carbonates: 5 to 25 percent; fine and medium; masses and nodules; throughout
EC (dS/cm): 0 to 1
SAR: 0 to 15
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Jardin Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Interfluves
Parent material: Eolian sands mixed with calcareous, loamy residuum of the Goliad Formation
Slope range: 0 to 3 percent
Associated soils: Comitas, Cuevitas, Delfina, Delmita, Nueces, Randado, and Sarita series.
Taxonomic class: Loamy, mixed, superactive, hyperthermic, shallow, Petrocalcic Paleustolls

Typical Pedon

Jardin fine sandy loam, 1 to 3 percent slopes; in Brooks County, Texas; from the intersection of Farm Road 755 and Farm Road 430, 5.1 miles north and west of Farm Road 430 to Alta Colorado Ranch entrance, 1.7 miles west on ranch road, 0.6 mile north on ranch road, 3.4 miles west of ranch road, and 50 feet north in rangeland. Santa Elena NW, Texas USGS topographic quadrangle; Latitude: 26 degrees, 56 minutes, 48.3 seconds North; Longitude: 98 degrees, 23 minutes, 38.7 seconds West; NAD 1927.

A1—0 to 9 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular and subangular blocky structure; hard, friable; common fine and very fine roots; few fine and very fine pores; few fine root channels and insect tunnels; few indurated calcrete fragments up to 1 inch across their long axis; moderately alkaline; clear smooth boundary.
A2—9 to 17 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; hard, friable; few fine and very fine roots and pores; few fine root channels and insect tunnels; few indurated calcrete fragments up to 1 inch across their long axis; moderately alkaline; abrupt wavy boundary.
Bkkm1—17 to 22 inches; very pale brown (10YR 8/2) strongly cemented calcium carbonate; somewhat platy and fractured in upper 2 to 3 inches, massive below; upper surface is etched and contains a few brown bands; moderately alkaline; gradual wavy boundary.
Bkkm2—22 to 80 inches; very pale brown (10YR 8/2) weakly cemented calcium carbonate; massive but contains a few fractures spaced further than 4 inches apart; moderately alkaline.

Range in Characteristic

Depth to petrocalcic horizon: 7 to 18 inches

A horizon

Hue: 10YR
Value: 4 or 5
Chroma: 2 or 3
Texture: Fine sandy loam or loam
Clay content: 12 to 18 percent
Rock fragments: A1 horizon—0 to 10 percent; A2 horizon—up to 25 percent
Effervescence: Noneffervescent
Reaction: Neutral to moderately alkaline

Bkkm horizon

Hue: 10YR
Value: 8
Chroma: 1 or 2
Texture: Weakly to indurated calcium carbonate (petrocalcic)
Calcium carbonate equivalent: 40 to 80 percent
Effervescence: Violent
Reaction: Slightly alkaline or moderately alkaline

Lomart Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Erosional remnants
Parent material: Residuum loamy, noncalcareous, tuffaceous, residuum in the Catahoula Formation of Miocene age
Slope range: 1 to 5 percent
Associated soils: Houla, Mirasol, Salco, and Tela
Taxonomic class: Coarse-loamy, mixed, superactive, hyperthermic, Aridic Calciustepts

Typical Pedon

Lomart loam, 1 to 5 percent slopes; in Duval County Texas; from the intersection of U.S. Highway 16 and U.S. Highway 59 in Freer, 6.0 miles north on U.S. 16, and 100 feet west in rangeland. Freer NW, Texas USGS topographic quadrangle; Latitude: 27 degrees, 58 minutes, 11 seconds North; Longitude: 98 degrees, 36 minutes, 43 seconds West; NAD 83.

A—0 to 6 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable; few fine roots; common fine pores; few insect tunnels; 1 percent fine nodules of calcium carbonate; 1 percent snail shell fragments; 2 percent noncalcareous, weakly cemented tuffaceous sandstone paragravels greater than 1 inch but less than 3 inches in diameter; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—6 to 10 inches; very pale brown (10YR 8/3) paragravelly silt loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; hard, friable; few fine roots; few fine pores; few insect tunnels; about 1 percent fine coatings of calcium carbonate on parafragments; 1 percent snail shell fragments; about 32 percent noncalcareous, weakly cemented tuffaceous sandstone paragravels with 12 percent larger than 3 inches and 20 percent smaller than 3 inches in diameter; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—10 to 38 inches; very pale brown (10YR 8/3) extremely paracobbly silt loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; very hard, firm; few fine roots; about 1 percent fine coating of calcium carbonate on parafragments; about 65 percent noncalcareous, weakly cemented tuffaceous sandstone paracobbles with 60 percent larger than 3 inches and 40 percent less than 3 inches in diameter; violently effervescent; moderately alkaline; gradual wavy boundary.

Cr—38 to 80 inches; pale yellow (5Y 7/4) noncalcareous, weakly cemented tuffaceous sandstone, pale olive (5Y 6/4) moist; about 1 percent calcium carbonate coatings on pararock fragments and in fractures; noneffervescent; moderately alkaline.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to calcic horizon: 3 to 7 inches
Depth to paralithic contact: 21 to 40 inches
Pararock fragments: 20 to 65 percent

A horizon

Hue: 10YR
Value: 5 to 7
Chroma: 3 or 4
Texture: Loam or silt loam
Clay content: 8 to 15 percent
Pararock fragments: 0 to 10 percent
Calcium carbonate equivalent: 0 to 5 percent
Identifiable secondary carbonate: 0 to 1 percent; fine; nodules; throughout
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bk1 horizon (Bw, where present)

Hue: 10YR
Value: 5 to 8
Chroma: 3 or 4
Texture: Paragravelly fine sandy loam, paragravelly silt loam, or paragravelly loam
Clay content: 6 to 12 percent
Pararock fragments: 20 to 45 percent
Calcium carbonate equivalent: 10 to 15 percent
Identifiable secondary carbonate: 0 to 3 percent; fine; coatings; faces of pararock fragments
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

Bk2 horizon

Hue: 10YR or 2.5YR
Value: 6 to 8
Chroma: 3 or 4
Texture: Very paracobbly, very fine sandy loam extremely paracobbly, very fine sandy loam very paracobbly, silt loam extremely paracobbly, silt loam very paracobbly, loam or extremely paracobbly loam
Clay content: 6 to 12 percent
Pararock fragments: 40 to 65 percent
Calcium carbonate equivalent: 10 to 15 percent
Identifiable secondary carbonate: 0 to 3 percent; fine; coatings; faces of pararock fragments
EC (dS/m): 0 to 4
SAR: 0.5 to 4
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

Cr layer

Hue: 2.5Y or 5Y
Value: 6 to 8
Chroma: 3 or 4
Paralithic materials: Weakly cemented to moderately cemented sandstone
Calcium carbonate equivalent: 0 to 5 percent
Identifiable secondary carbonate: 0 to 1 percent; coatings; on faces of pararock fragments and in fractures
Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline or moderately alkaline

Maverick Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Slow
Landform: Ridges and interfluves
Parent material: Residuum derived from Tertiary shale
Slope range: 1 to 3 percent
Associated soils: Brundage, Catarina, Monwebb, and Tela
Taxonomic class: Fine, smectitic, hyperthermic, Aridic Haplustepts

Typical Pedon

Maverick clay, 1 to 3 percent slopes; in Maverick County, Texas; from the intersection of U.S. Highway 277 and U.S. Highway 57 in Eagle Pass, 3.9 miles northeast, and 50 feet south into rangeland (fig. 17). Eagle Pass East, Texas USGS topographic quadrangle; Latitude: 28 degrees, 45 minutes, 6.2 seconds North; Longitude: 100 degrees, 25 minutes, 37.8 seconds West; NAD 83.

A—0 to 5 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure parting to moderate fine and very fine angular blocky; very hard, firm, very sticky and very plastic; common fine roots; few fine pores; few wormcasts; very slightly effervescent; slightly saline; few quartzite pebbles in soil and on surface; moderately alkaline; clear wavy boundary.

Bkz—5 to 21 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; moderate fine and medium angular blocky structure; extremely hard, very firm, very sticky and very plastic; common fine roots; few fine pores; few streaks and pockets of grayish brown clay; shiny pressure surfaces of peds; 2 percent fine calcium carbonate masses; few threads of neutral salts; violently effervescent; moderately saline; moderately alkaline; clear wavy boundary.

Bkyz—21 to 26 inches; pale yellow (2.5Y 7/4) clay, light yellowish brown (2.5Y 6/4) moist weak angular blocky structure; very hard, firm, very sticky and very plastic; 10 percent masses, films and threads of gypsum, calcium carbonate, and other salts; 2 percent fine brownish yellow (10YR 6/8) and yellow (2.5Y 7/8) masses of oxidized iron; violently effervescent; moderately saline; moderately alkaline; abrupt wavy boundary.

Cdkyz—26 to 80 inches; pale yellow (2.5Y 7/4) fractured weathered mudstone bedrock; light yellowish brown (2.5Y 6/4) moist; moderate fine and medium platy rock structure; very hard, firm; horizontal spacing between cracks is less than 4 inches; 2 percent pockets and threads of calcium carbonate and other salts; few seams of gypsum crystals about 1/2 inch thick; 2 percent fine brownish yellow (10YR 6/8) mottles of oxidized iron; violently effervescent; moderately saline; moderately alkaline.

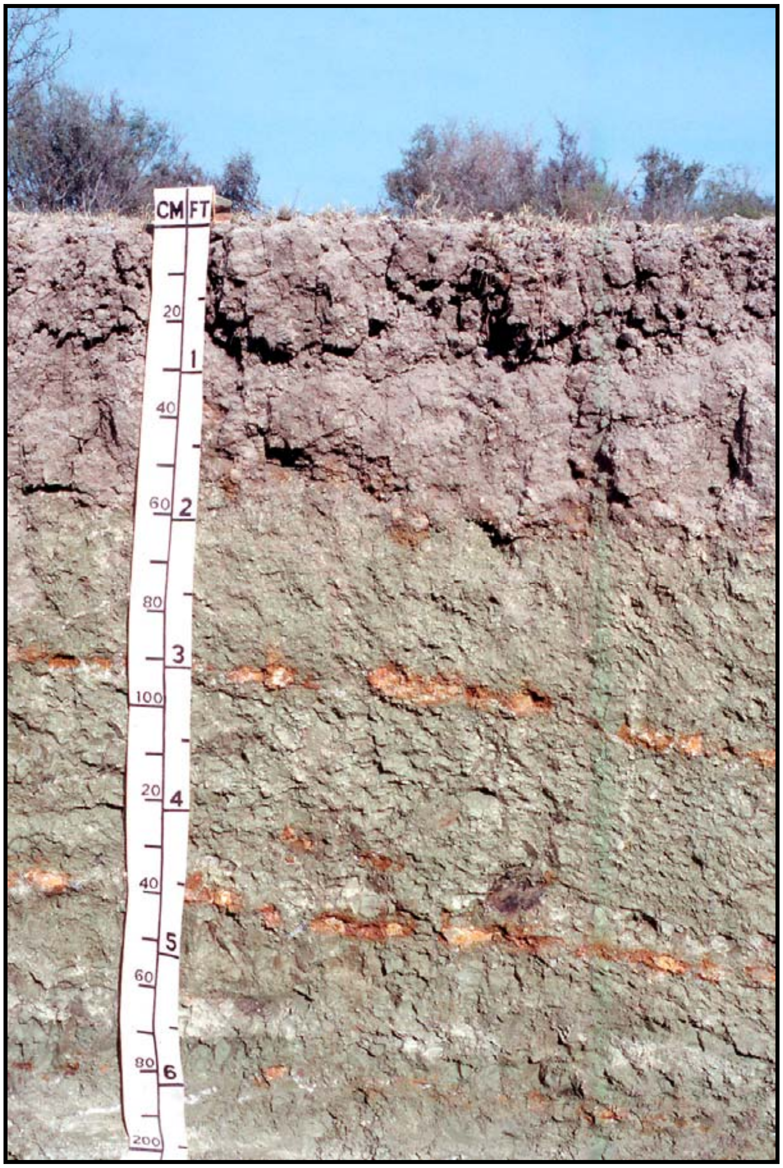

Figure 17.—Profile of Maverick clay, 1 to 3 percent slopes. The olive colored material beginning at around 35 inches (90 cm) slakes in water, and qualifies as densic material. The layer between 24 to 35 inches (60 to 90 cm) is a transitional area. The brown bands in the subsoil are layers of strongly cemented gypsum crystals. (Scale in cm—centimeters, and ft—feet)

Range in Characteristics

Solum thickness: 20 to 40 inches to densic material (weathered mudstone bedrock)
Clay content: 35 to 55 percent
Coarse fragments: 0 to 5 percent
CEC/clay ratio: 0.6 to 1.00

A horizon

Hue: 10YR to 5Y
Value: 5 or 6

Chroma: 2 to 4
Texture: Clay, gravelly clay, or very gravelly clay
Clay content: 30 to 55 percent
Coarse fragments: 0 to 50 percent
Base saturation: 80 to 100 percent
Calcium carbonate equivalent: 5 to 15 percent
EC (dS/m): 2 to 4
Gypsum: 0 to 2 percent
SAR: 13 to 20
Effervescence: Very slight or slight
Reaction: Slightly alkaline to strongly alkaline

Bkz and Bkyz horizons

Hue: 10YR to 5Y
Value: 5 to 7
Chroma: 2 to 6
Texture: Clay loam or clay
Clay content: 35 to 55 percent
Redox concentrations: None to few; fine to medium; faint or distinct; diffuse to sharp
Coarse fragments: 0 to 10 percent
Pararock fragments: 0 to 5 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 5 to 25 percent, averaging less than 15 percent. Where the percentage is more than 15 percent, the horizon is less than 6 inches thick
Identifiable secondary carbonate: 1 to 20 percent; fine or medium; films, masses, and threads; on surfaces of peds and within peds
EC (dS/m): 4 to 16
Gypsum: 0 to 10 percent
SAR: 13 to 20
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Cdkyz horizon

Type material: Mudstone bedrock (densic material) sometimes intermingled with clay or clay loam. Seams of gypsum are few to many. Isolated crystalline masses of salts more soluble than gypsum occur in some pedons. The mudstone is also interbedded with sandstone in some pedons.

Mirasol Series

Depth class: Very shallow and shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Cuestas
Parent material: Loamy residuum derived from tuff
Slope range: 1 to 8 percent
Associated soils: Houla, Lomart, Salco, and Tela
Taxonomic class: Loamy-skeletal, mixed, superactive, hyperthermic, shallow, Typic Durustepts

Typical Pedon

Mirasol very gravelly sandy loam, 1 to 8 percent slopes; in Duval County, Texas; from the intersection of Texas Highway 359 and Texas Highway 339 in Benavides, 21.0 miles northwest on Texas Highway 339, 3.4 miles north on Texas Highway 16, 6.9 miles west

on U.S. Highway 59, 1.4 miles north on private ranch road, and 40 feet east in rangeland. Freer NW, Texas USGS topographic quadrangle; Latitude: 27 degrees, 55 minutes, 58.0 seconds North; Longitude: 98 degrees, 42 minutes, 37.0 seconds West; NAD 83.

A—0 to 6 inches; brown (10YR 5/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak fine granular and subangular blocky structure; hard, friable; slightly sticky and nonplastic; common fine and few medium roots; about 35 percent noncalcareous sandstone fragments ranging in size from 1 to 5 inches in diameter; noneffervescent; moderately alkaline; clear smooth boundary.

Bw—6 to 16 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and nonplastic; common fine and few medium roots; about 45 percent noncalcareous sandstone fragments ranging in size from 1 to 5 inches in diameter; about 5 percent calcrete fragments less than 3 inches in diameter; slightly effervescent; moderately alkaline; abrupt smooth boundary.

Bkqm—16 to 19 inches; light yellowish brown (2.5Y 6/4) strongly cemented duripan, light olive brown (2.5Y 5/4) moist; massive; with plates 1/4 to 1 inches thick that have 2 percent coating of calcium carbonate; extremely hard, extremely firm; many fine and medium roots matted on top of laminar cap; laminar cap is 1/4 to 1/2 inch thick; many fine and very fine roots matted on top of laminar cap; violently effervescent along laminar cap; duripan material is noneffervescent; moderately alkaline; clear wavy boundary.

Bqm—19 to 80 inches; light yellowish brown (2.5Y 6/4) strongly cemented duripan, light olive brown (2.5Y 5/4) moist; massive; few fine and medium roots along cracks and fractures; noneffervescent; moderately alkaline

Range in Characteristics

Depth to duripan: 7 to 20 inches
Coarse fragments: 35 to 80 percent

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 3 or 4
Texture: Gravelly sandy loam or very gravelly sandy loam
Clay content: 10 to 15 percent
Coarse fragments: 15 to 40 percent
Calcium carbonate equivalent: 0 to 5 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 2 percent
SAR: 0 to 2
Effervescent: Noneffervescent
Reaction: Slightly alkaline or moderately alkaline

Bw horizon

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 4 to 6
Texture: Gravelly sandy loam, very gravelly sandy loam, gravelly sandy clay loam, or very gravelly sandy clay loam
Clay content: 15 to 25 percent
Coarse fragments: 30 to 60 percent
Calcium carbonate equivalent: 15 to 25 percent
EC (dS/m): 0 to 4
Gypsum: 0 to 4 percent
SAR: 0 to 4

Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline or moderately alkaline

Bkqm and Bqm horizons

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 4 to 7
EC (dS/m): 0 to 8
Gypsum: 0 to 4 percent
SAR: 0 to 8
Effervescence: Noneffervescent to violent
Reaction: Slightly alkaline or moderately alkaline

Moglia Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Interfluve
Parent material: Calcareous, saline loamy residuum weathered from mudstone
Slope range: 1 to 5 percent
Associated soils: Aguilares, Brundage, Catarina, Copita, Maverick, and Tela
Taxonomic class: Fine-loamy, mixed, active, hyperthermic, Aridic Calciustepts

Typical Pedon

Moglia clay loam, 1 to 5 percent slopes; in Webb County, Texas; from intersection of U.S. Highway 59 and Interstate Highway 35 in Laredo, 22.05 miles east on U.S. Highway 59, and 50 feet south of fence in rangeland. Piedra Parada Tank, Texas USGS topographic quadrangle; Latitude: 27 degrees, 39 minutes, 3 minutes North; Longitude: 99 degrees, 10 minutes, 27 seconds West; NAD 83.

A—0 to 7 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure parting to weak fine granular; hard, firm, sticky and plastic; many fine and medium roots; few fine pores; 6 percent calcium carbonate equivalent; strongly effervescent; moderately alkaline; clear wavy boundary.

Bkz—7 to 21 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium angular blocky structure; very hard, firm, sticky and plastic; common fine roots in upper part, few fine roots below; few fine pores; 2 percent films and threads of calcium carbonate; few siliceous pebbles; 15 percent calcium carbonate equivalent; violently effervescent; saline; slightly alkaline; clear wavy boundary.

Bknz—21 to 30 inches; very pale brown (10YR 7/4) clay loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; few fine pores; 5 percent films of calcium carbonate; 16 percent calcium carbonate equivalent, violently effervescent; saline; slightly alkaline; clear wavy boundary.

2Bknz—30 to 42 inches; pink (7.5YR 7/4) loam, light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine roots in upper part; 5 percent films of calcium carbonate; 15 percent calcium carbonate equivalent; violently effervescent; saline; slightly alkaline; clear wavy boundary.

2Bknyz—42 to 54 inches; pink (7.5YR 8/4) loam, pink (7.5YR 7/4) moist; weak fine subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; 3 percent films, threads, and masses of calcium carbonate; 8 percent masses and crystals of gypsum; 8 percent calcium carbonate equivalent; violently effervescent; saline; slightly alkaline; clear wavy boundary.

3Bknyz—54 to 80 inches; pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; very hard, firm, sticky, and plastic; 3 percent threads, films, and masses of calcium carbonate; 15 percent threads, films, masses, and crystals of gypsum and other salts; 7 percent calcium carbonate equivalent; violently effervescent; saline; slightly alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Depth to calcic horizon: 5 to 39 inches. The calcic horizon has a calcium carbonate equivalent of 5 to 15 percent more than the underlying material.
Depth to gypsic horizon: 40 to 80 inches
Total clay content: 25 to 45 percent
Silicate clay content: 20 to 35 percent
Coarse fragments: 0 to 10 percent
CEC/clay ratio: 0.60 to 0.90

A horizon

Hue: 10YR or 2.5Y
Value: 5 or 6
Chroma: 2 to 4
Texture: Clay loam
Total clay content: 20 to 40 percent
Silicate clay content: 20 to 35 percent
Coarse fragments: 0 to 10 percent, siliceous
Base saturation: 100 percent
Calcium carbonate equivalent: 2 to 10 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
SAR: 0 to 5
Effervescence: Very slight or slight
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 7.5YR to 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Clay loam or clay
Total clay content: 30 to 45 percent
Silicate clay content: 25 to 35 percent
Coarse fragments: 0 to 10 percent, siliceous
Base saturation: 100 percent
Calcium carbonate equivalent: 5 to 25 percent
Identifiable secondary carbonate: 5 to 20 percent; fine and medium; films, threads, and masses; throughout
EC (dS/m): 2 to 8. The EC decreases with depth in most pedons, but is more than 4 dS/m in all subsoil horizons below 25 inches.
Gypsum: 0 to 1 percent
SAR: 5 to 35. SAR increases with depth and is 15 to more than 30 in some horizon within 25 inches of the soil surface.
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

2B and 3B horizon

Hue: 7.5YR to 2.5Y

Value: 6 to 8
Chroma: 2 to 4
Texture: Loam, clay loam, clay, and the clay intermingled with weathered mudstone
Clay content: 15 to 30 percent in the 2B horizon; 30 to 50 percent in the 3B horizon
Coarse fragments: 0 to 15 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 2 to 25 percent
Identifiable secondary carbonate: 1 to 19 percent; fine to medium; films, threads, masses, and concretions
EC (dS/m): 8 to 16
Gypsum: 0 to 20 percent. Visible crystals of gypsum and other salts range from 0 to 25 percent by volume and occur at depths below 40 inches
SAR: 13 to 40
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Monwebb Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landform: Valley flat
Parent material: Clayey alluvium derived from the Frio Formation and Jackson Formation
Slope range: 0 to 1 percent
Associated soils: Brundage, Catarina, Maverick, and Moglia
Taxonomic class: Fine, smectitic, hyperthermic, Sodic Haplusterts

Typical Pedon

Monwebb clay, 0 to 1 percent slopes, occasionally flooded; in Webb County, Texas; from the intersection of U.S. Highway 59 and Texas Highway 44 in Duval County, 13.4 miles northwest into Webb County on Texas Highway 44 to Pintas-Adami Road, 3.1 miles north on Pintas-Adami Road, and 800 feet northwest in rangeland (fig. 18). Biel Lake NE, Texas USGS topographic quadrangle; Latitude: 27 degrees, 58 minutes, 48.4 seconds North; Longitude: 98 degrees, 51 minutes, 39.7 seconds West; NAD 83.

A—0 to 5 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; many fine and medium roots, few coarse roots; few very fine tubular pores; SAR is 2; 1 percent rounded chert pebbles; strongly effervescent; moderately alkaline; clear wavy boundary.
An—5 to 11 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure parting to weak fine and medium granular; extremely hard, very firm, very sticky, and very plastic; common fine and few medium roots; few very fine tubular pores; 5 percent distinct pressure faces; SAR is 8; 1 percent rounded chert pebbles; strongly effervescent; moderately alkaline; clear wavy boundary.
Bnss—11 to 28 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate fine and medium angular blocky structure; extremely hard, very firm, very sticky, and very plastic; common very fine and fine roots, few coarse roots; few very fine tubular pores; 10 percent distinct pressure faces; 1 percent fine masses of salt; SAR is 22; 1 percent rounded chert pebbles; few fine distinct yellowish brown (10YR 5/4) redoximorphic features along root channels; strongly effervescent; slightly alkaline; clear wavy boundary.

Figure 18.—Profile of Monwebb clay, 0 to 1 percent slopes, occasionally flooded. The presence of slickensides from 11 to 39 inches indicates the high shrink-swell potential of this soil. Other soil features influencing soil properties are the presence of secondary calcium carbonates, gypsum crystals, and salt crystals. (Scale in Inches)

Bnssz—28 to 39 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate fine and medium prismatic structure parting to moderate fine and medium angular blocky; extremely hard, very firm, very sticky and very plastic; common very fine and fine roots; few very fine pores; common fine pressure faces; 3 percent fine threads and 1 percent very fine salt crystals; SAR is 23; 1 percent rounded chert pebbles; 1 percent snail shell fragments; few coarse distinct masses of yellowish brown (10YR 5/4) redox features; strongly effervescent; slightly alkaline; gradual wavy boundary.

Bknssz—39 to 46 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate medium and coarse prismatic structure parting to moderate medium angular blocky; extremely hard, very firm, very sticky, and very plastic; few very fine roots; few very fine tubular pores; 1 percent medium and coarse calcium carbonate masses; 1 percent faint dark grayish brown (10YR 4/2) moist, organic stains; few fine pressure faces; 2 percent fine masses and 1 percent fine threads of salts; SAR is 25; 1 percent rounded chert pebbles; strongly effervescent; slightly alkaline; gradual wavy boundary.

Bknz1—46 to 59 inches; 70 percent pale brown (10YR 6/3), 20 percent grayish brown (10YR 5/2), and 10 percent light gray (10YR 7/2) clay, brown (10YR 5/3), dark grayish brown (10YR 4/2,) and light brownish gray (10YR 6/2) moist; weak medium and coarse prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky, and very plastic; few very fine roots; few very fine tubular pores; 3 percent medium and coarse calcium carbonate masses; 2 percent fine masses and threads of salts; SAR is 27; 1 percent rounded chert pebbles; few fine distinct masses of yellowish brown (10YR 5/4) redoximorphic concentrations, few medium distinct masses of light gray (10YR 7/1) iron depletions, few very fine iron-manganese masses; strongly effervescent; slightly alkaline; diffuse wavy boundary.

Bknz2—59 to 77 inches; 60 percent light gray (10YR 7/2) and 40 percent very pale brown (10YR 7/3) clay loam, light brownish gray (10YR 6/2) and pale brown (10YR 6/3) moist; weak medium and coarse prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky, and very plastic; common very fine tubular pores; 1 percent very fine masses of calcium carbonate; 2 percent fine masses and threads of salts; SAR is 31; 1 percent rounded chert pebbles; few very fine iron-manganese masses; few fine distinct masses of yellowish brown (10YR 5/4) redoximorphic masses with diffuse boundaries; strongly effervescent; moderately alkaline; diffuse wavy boundary.

Bknz3—77 to 80 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; few very fine tubular pores; 1 percent very fine masses of calcium carbonate; 1 percent very fine masses of salts; SAR is 29; 1 percent rounded chert pebbles; slightly effervescent; moderately alkaline.

Range in Characteristics

Clay content: 40 to 55 percent
Rock fragments: 0 to 5 percent

A and An horizon

Hue: 10YR
Value: 3 or 4
Chroma: 1 or 2
Texture: Clay
Clay content: 35 to 50 percent
Rock fragments: 0 to 5 percent
Base saturation: 90 to 100 percent
Calcium carbonate equivalent: 0 to 15 percent
EC (dS/m): 0 to 8
Gypsum: 0 to 1 percent
SAR: 0 to 13
Effervescence: Slight or strong
Reaction: Neutral to moderately alkaline

Bnss horizon

Hue: 10YR
Value: 3 to 5
Chroma: 2 or 3
Texture: Clay loam or clay
Clay content: 35 to 55 percent
Rock fragments: 0 to 5 percent
Base saturation: 90 to 100 percent
Calcium carbonate equivalent: 0 to 15 percent
EC (dS/m): 8 to 20
Gypsum: 1 to 4 percent
SAR: 15 to 40
Effervescence: Slight to violent
Reaction: Neutral to moderately alkaline

Bknssz horizon

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 1 to 3
Texture: Clay loam or clay
Clay content: 35 to 55 percent
Rock fragments: 0 to 5 percent
Base saturation: 90 to 100 percent
Calcium carbonate equivalent: 0 to 15 percent
EC (dS/m): 8 to 20
Gypsum: 1 to 4 percent
SAR: 15 to 40
Effervescence: Slight to violent
Reaction: Neutral to moderately alkaline

Bknz horizon

Hue: 10YR or 2.5Y
Value: 4 to 7
Chroma: 1 to 3
Texture: Clay loam or clay
Clay content: 35 to 55 percent
Rock fragments: 0 to 5 percent
Base saturation: 90 to 100 percent
Calcium carbonate equivalent: 0 to 15 percent
EC (dS/m): 8 to 20
Gypsum: 2 to 5 percent
SAR: 15 to 40
Effervescence: Slight to violent
Reaction: Neutral to moderately alkaline

Nueces Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Vegetated sandsheet
Parent material: Eolian sands of Holocene age over alluvium of Quaternary age
Slope range: 0 to 5 percent

Associated soils: Comitas, Delfina, Papagua, and Sarita
Taxonomic class: Loamy, mixed, active, hyperthermic, Arenic Paleustalfs

Typical Pedon

Nueces fine sand, 0 to 5 percent slopes; in Brooks County, Texas; from the intersection of U.S. Highway 281 and Farm Road 755 in Rachal, 6.45 miles west on Farm Road 755, 2.1 miles south on caliche road to dead end, and 150 feet east in rangeland (fig. 19). Hartland, Texas USGS topographic quadrangle; Latitude: 26 degrees, 51 minutes, 44 seconds North; Longitude: 98 degrees, 14 minutes, 12 second West; NAD 83.

A—0 to 10 inches; pale brown (10YR 6/3) fine sand, brown (10YR 4/3) moist; single grain; loose; very friable, nonsticky and nonplastic; neutral; gradual smooth boundary.
E1—10 to 23 inches; brown (7.5YR 5/4) fine sand, brown (7.5YR 4/4) moist; single grain; loose; very friable, nonsticky, and nonplastic; neutral; gradual smooth boundary.
E2—23 to 31 inches; light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; single grain; loose; very friable, nonsticky, and nonplastic; neutral; abrupt wavy boundary.
2Bt1—31 to 40 inches; light brownish gray (10YR 6/2) sandy clay loam, grayish brown (10YR 5/2) moist; moderate coarse prismatic structure parting to moderate medium angular blocky; extremely hard, firm, slightly sticky, and slightly plastic; common fine pores; few distinct clay films and organic coatings on faces of peds; common fine and medium distinct reddish yellow (7.5YR 6/6) masses of redoximorphic concentrations; neutral; gradual smooth boundary.
2Bt2—40 to 48 inches; light gray (10YR 7/2) sandy clay loam, light brownish gray (10YR 6/2) moist; moderate medium prismatic structure parting to moderate medium angular blocky; extremely hard, firm, slightly sticky, and slightly plastic; few fine pores; common distinct clay films and organic coatings on faces of peds; many medium coarse prominent reddish yellow (5YR 6/8) masses of redoximorphic concentrations; neutral; gradual wavy boundary.
2Bt3—48 to 80 inches; yellow (10YR 7/6) sandy clay loam; brownish yellow (10YR 6/6) moist; weak medium blocky structure; very hard, firm, slightly sticky, and slightly plastic; few distinct dark grayish brown (10YR 4/2) few faint clay films and organic stains on faces of peds; common coarse prominent reddish yellow (5YR 6/8) masses of oxidized iron; moderately alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Depth to argillic horizon: 20 to 40 inches
Clay content: 18 to 35 percent
Coarse fragments: 0 to 5 percent
CEC/clay ratio: 0.40 to 0.60

A and E horizons

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 2 to 4
Texture: Fine sand or loamy fine sand
Clay content: 2 to 12 percent
Coarse fragments: 0 to 5 percent fine gravel
Base saturation: 90 to 100 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 1 percent
SAR: 0 to 2
Effervescence: Noneffervescent
Reaction: Moderately acid to neutral

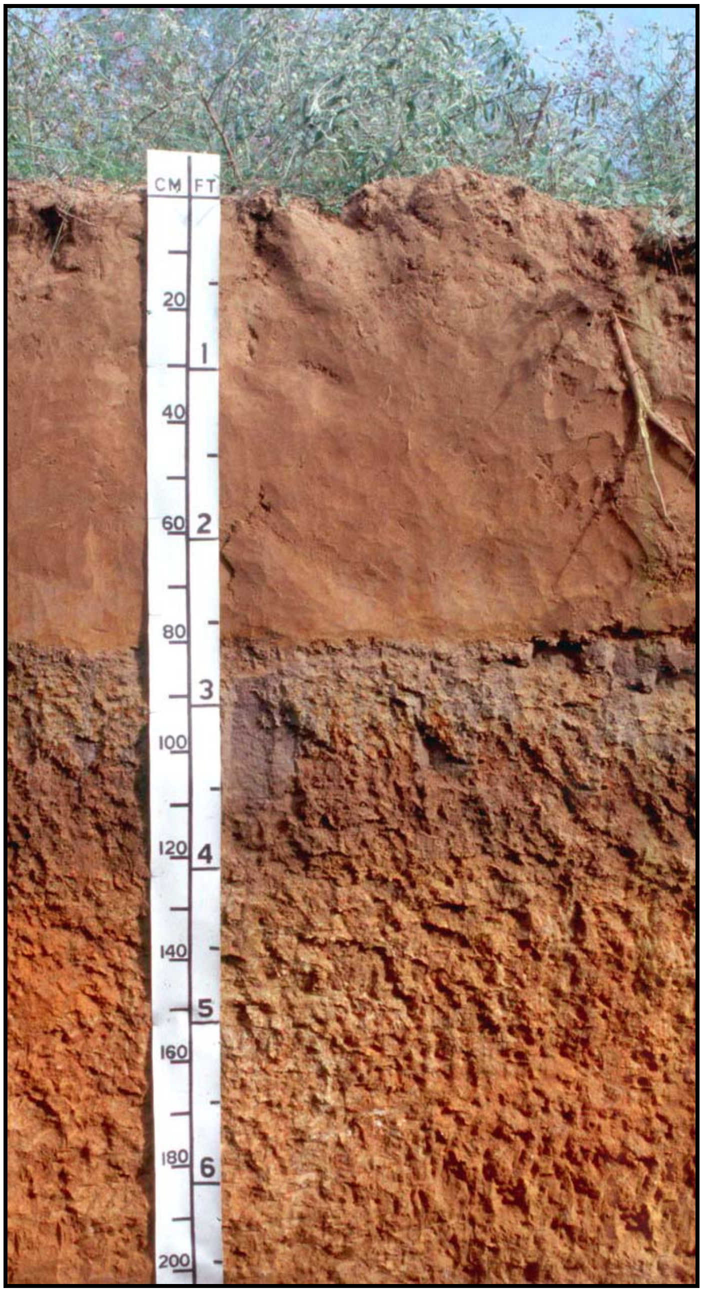

Figure 19.—Profile of Nueces fine sand, 0 to 5 percent slopes. The sandy surface layer can range from about 20 to 40 inches (50 to 100 cm) in thickness. This soil is susceptible to wind erosion. (Scale in CM—centimeters, and FT—feet)

2Bt horizon

Hue: 7.5YR to 2.5Y
Value: 5 to 8
Chroma: 2 to 6
Texture: Fine sandy loam or sandy clay loam
Clay content: 18 to 35 percent

Clay films: Few or common; faint to prominent; on faces of peds, lining pores, and bridging of sand grains
Redox concentrations: Common or many in the upper part and none to common in the lower part; fine and medium; faint to prominent; diffuse the upper part and sharp in the lower part
Redox depletions: None to common; fine and medium; faint to prominent; diffuse in the upper part and sharp in the lower part
Coarse fragments: 0 to 5 percent fine pebbles
Base saturation: 90 to 100 percent
Calcium carbonate equivalent: 0 to 2 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 2 percent
SAR: 0 to 7
Other features: Some pedons have a darker colored horizon that is 1 to 3 inches thick and enriched with organic matter overlying the 2Bt horizon. This layer contains less than 1 percent organic matter.
Effervescence: Noneffervescent or very slight in the lower part
Reaction: Neutral to moderately alkaline

Nusil Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Stream terrace
Parent material: Eolian sands of Holocene age over alluvium of Quaternary age
Slope range: 1 to 5 percent
Associated soils: Alet, Annarose, Clareville, Czar, and Weesatche
Taxonomic class: Loamy, siliceous, active, hyperthermic, Arenic Paleustalfs

Typical Pedon

Nusil loamy fine sand, 1 to 5 percent slopes; in Duval County, Texas; from the Duval County and McMullen County line on U.S. Highway 59, 2.0 miles east on ranch road, 1.1 miles south on ranch road, 4,100 feet southeast on ranch road, 2,500 feet north on ranch road, and 1,000 feet east on terrace of Lagarto Creek, in rangeland. Salarita Ranch, Texas USGS topographic quadrangle; Latitude: 28 degrees, 3 minutes, 19.3 seconds North; Longitude: 98 degrees, 17 minutes, 46.4 seconds West; NAD 83.

A1—0 to 6 inches; brown (10YR 5/3) loamy fine sand, brown (10YR 4/3), moist; single grain; very friable, loose, nonsticky, nonplastic; common very fine and common fine roots; noneffervescent; slightly acid; clear smooth boundary.
A2—6 to 15 inches; light yellowish brown (10YR 6/4) loamy fine sand, brown (10YR 5/3), moist; single grain; very friable, loose, nonsticky, nonplastic; common very fine roots and common fine roots; noneffervescent; slightly acid; clear smooth boundary.
E—15 to 28 inches; light brownish gray (10YR 6/2) loamy fine sand, grayish brown (10YR 5/2), moist; single grain; very friable, loose, nonsticky, nonplastic; common very fine and common fine roots; noneffervescent; slightly acid; abrupt smooth boundary.
Bt1—28 to 43 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4), moist; moderate medium subangular blocky structure; very firm, hard, moderately sticky, very plastic; common very fine and common fine roots; common very fine and fine vesicular pores; 30 percent distinct clay films on vertical faces of peds; noneffervescent; moderately alkaline; clear wavy boundary.

Bt2—43 to 62 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6), moist; weak medium prismatic structure; firm, hard, moderately sticky, very plastic; common very fine and common fine roots; common very fine and fine vesicular pores; 15 percent faint clay films on vertical faces of peds; noneffervescent; moderately alkaline; clear smooth boundary.

Btk—62 to 80 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6), moist; weak medium prismatic structure; firm, hard, moderately sticky, moderately plastic; common very fine vesicular pores; 5 percent faint clay films on vertical faces of peds; 1 percent fine distinct spherical black (10YR 2/1), moist, manganese masses with clear boundaries, and 2 percent fine faint irregular strong brown (7.5YR 5/8), moist, masses of oxidized iron with diffuse boundaries; 2 percent fine and medium irregular carbonate masses; strongly effervescent; moderately alkaline.

Range in Characteristics

Clay content: 18 to 35 percent

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Fine sand
Clay content: 3 to 10 percent
Reaction: Slightly acid to slightly alkaline

E horizon

Hue: 7.5YR or 10YR
Value: 6 or 7
Chroma: 2 to 4
Texture: Fine sand or loamy fine sand
Clay content: 3 to 10 percent
Redox concentrations: 0 to 10 percent; fine and medium; yellow and brown; faint or distinct; sharp; throughout
Reaction: Slightly acid to slightly alkaline

Bt horizon (and Btk horizon, where present)

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 2 to 6
Texture: Fine sandy loamy or sandy clay loam
Clay content: 18 to 35 percent
Redox concentrations (relic): 2 to 25 percent; fine to coarse; brown, yellow, and red; distinct; sharp; throughout
Redox depletions (relic): 0 to 2 percent; fine; sharp; gray; throughout
Iron-manganese concentrations: 0 to 5 percent; fine; masses
Identifiable secondary carbonate: 0 to 5 percent, fine; masses; throughout
Reaction: Slightly acid to moderately alkaline

BC horizon (and BCk horizon, where present)

Hue: 7.5YR or 10YR
Value: 5 to 8
Chroma: 2 to 6
Texture: Fine sandy loam or sandy clay loam
Clay content: 15 to 30 percent

Redox concentrations: 0 to 15 percent; fine to coarse; red, yellow, or brown; distinct and sharp; throughout
Base saturation: 60 to 100 percent
Identifiable secondary carbonate: 0 to 10 percent; fine and medium; masses; throughout
Reaction: Slightly acid to moderately alkaline

Olmedo Series

Depth class: Very shallow and shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Ridge or interfluve
Parent material: Calcareous, loamy residuum of Miocene-Pliocene age
Slope range: 1 to 8 percent
Associated soils: Alet, Benavides, Pernitas, and Weesatche
Taxonomic class: Loamy-skeletal, carbonatic, hyperthermic, shallow, Petrocalcic Calciustolls

Typical Pedon

Olmedo very gravelly sandy loam, 1 to 8 percent slopes; in Live Oak County, Texas; from the intersection of U.S. Highway 281 and U.S. Highway 59 in George West, 5.5 miles east on U.S. Highway 59 to Interstate Highway 37, 9.3 miles south on Interstate Highway 37 to Farm Road 534, 5.4 miles west on Farm Road 534 to county road, 2.9 miles southwest and south on county road, and 500 feet east in rangeland (fig. 20). Crater Ridge, Texas USGS topographic quadrangle; Latitude: 28 degrees, 10 minutes, 51 seconds North; Longitude: 98 degrees, 0 minutes, 47 seconds West; NAD 83.

A1—0 to 8 inches; very dark grayish brown (10YR 3/2) very gravelly sandy loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky and granular structure; soft, very friable, nonsticky, and nonplastic; many fine roots; few snail shell fragments, common fine irregular nodules of calcium carbonate; common wormcasts; 58 percent, by volume, indurated platy and irregular shaped petrocalcic fragments with 5 percent larger than 3 inches and 53 percent smaller than 0.75 inches in diameter; strongly effervescent; slightly alkaline; clear wavy boundary.

A2—8 to 18 inches; brown (10YR 4/3) extremely gravelly sandy clay loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; few snail shell fragments; common fine irregular nodules of calcium carbonate; common wormcasts; 78 percent by volume indurated platy and irregular shaped petrocalcic fragments with approximately 15 percent larger than 3 inches and 63 percent smaller than 0.75 inch in diameter; violently effervescent; moderately alkaline; abrupt smooth boundary.

Bkkm—18 to 30 inches; 70 percent white (10YR 8/1) and 30 percent very pale brown (10YR 8/3), indurated calcium carbonate; white (10YR 8/1) and very pale brown (10YR 7/3) moist; massive; extremely hard, extremely firm, nonsticky, and nonplastic; common fine and medium roots matted on top of the petrocalcic and along fractured seams that are more than 4 inches apart; violently effervescent; moderately alkaline, gradual wavy boundary.

BCkk1—30 to 41 inches; white (10YR 8/1), silt loam, white (10YR 8/1) moist; massive; extremely hard, very firm, nonsticky, and nonplastic; few fine roots in cracks; many fine and medium masses of calcium carbonate; violently effervescent; strongly alkaline; gradual wavy boundary.

BCkk2—41 to 51 inches; white (10YR 8/1), silt loam; white (10YR 8/1) moist; massive; extremely hard, very firm, nonsticky, and nonplastic; few fine roots in cracks; many fine and medium masses of calcium carbonate; violently effervescent; strongly alkaline; gradual wavy boundary.

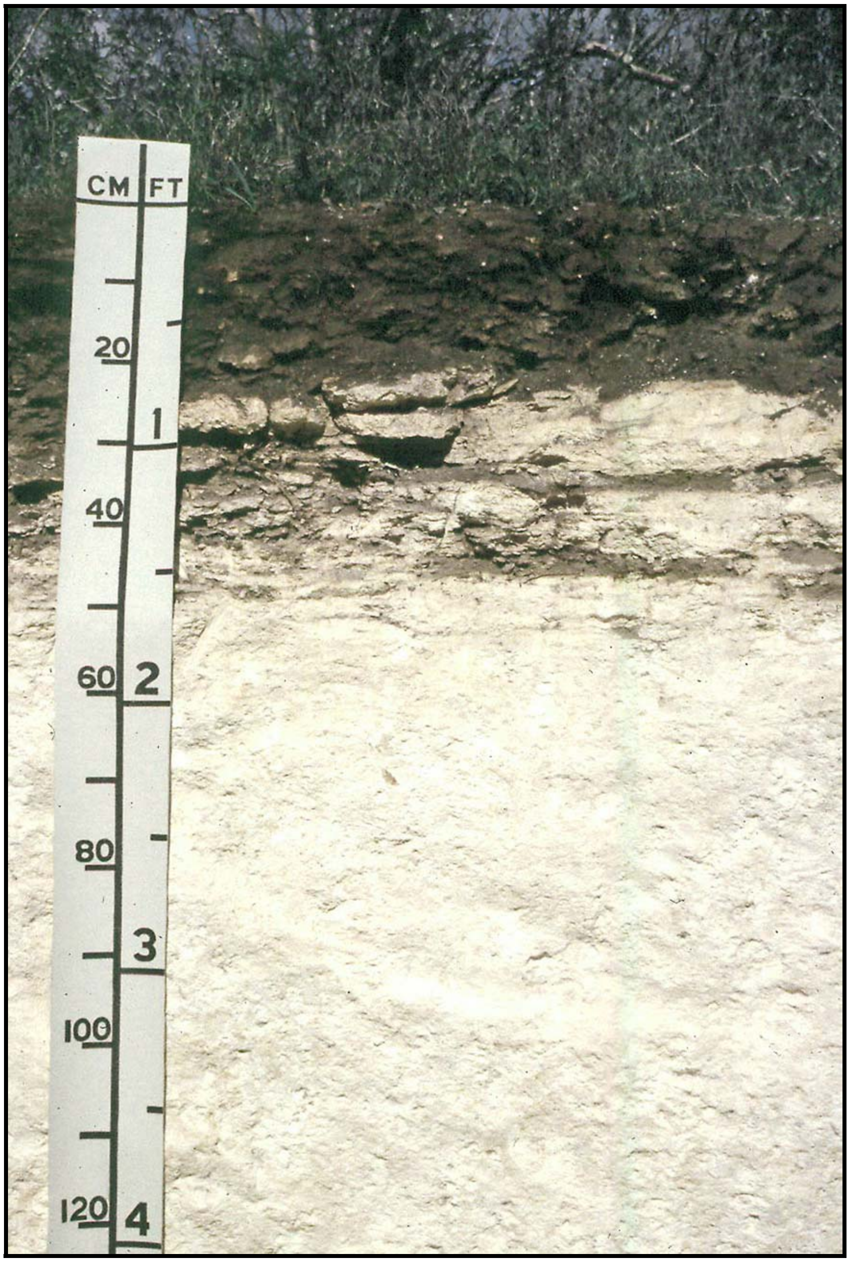

Figure 20.—Profile of Olmedo very gravelly sandy loam, 1 to 8 percent slopes. The dominant feature of this soil is the layer of indurated or strongly cemented secondary calcium carbonate known as a petrocalcic layer. The petrocalcic layer starts at 18 inches (46 cm). The petrocalcic layer reduces the water holding capacity and severely restricts roots. (Scale in CM—centimeters, and FT—feet)

BCk3—51 to 61 inches; white (10YR 8/1), paragravelly silt loam; white (10YR 8/1) moist; massive; extremely hard, very firm, nonsticky, and nonplastic; few fine roots in cracks; many fine and medium masses of calcium carbonate; 2 percent by volume rounded chert fragments; 20 percent by volume rounded weakly cemented calcium carbonate parafragments; violently effervescent; moderately alkaline; gradual wavy boundary.

BCk4—61 to 75 inches; white (10YR 8/1), paragravelly silt loam; white (10YR 8/1) moist; massive; extremely hard, very firm, nonsticky and nonplastic; few fine roots in cracks; 20 percent by volume medium size calcite crystals surrounded by soft powdery

calcium carbonate masses; many fine and medium masses of calcium carbonate, 2 percent by volume rounded chert fragments; 20 percent by volume rounded weakly cemented calcium carbonate parafragments; violently effervescent; moderately alkaline; gradual way boundary.

BCk5—75 to 80 inches; pink (7.5YR 7/3), paragravelly silt loam; light brown (7.5YR 6/4) moist; massive; extremely hard, very firm, nonsticky and nonplastic; few fine roots in cracks; 20 percent by volume rounded weakly cemented calcium carbonate parafragments; 20 percent by volume medium calcite crystals surrounded by soft powdery calcium carbonate; many fine and medium masses of calcium carbonate; 2 percent by volume rounded chert fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Depth to petrocalcic horizon: 10 to 18 inches
Clay content: 12 to 24 percent
Rock fragments: 35 to 85 percent

A horizon

Hue: 7.5YR or 10YR
Value: 3 to 5
Chroma: 1 to 3
Texture: Gravelly fine sandy loam, very gravelly fine sandy loam, or extremely gravelly fine sandy loam
Clay content: 12 to 22 percent
Rock fragments: 35 to 85 percent
Calcium carbonate equivalent: 10 to 70 percent
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Bkkm horizon

Hue: 10YR
Value: 8
Chroma: 1 or 2
Texture: Indurated calcium carbonate (petrocalcic)
Calcium carbonate equivalent: 40 to 80 percent
EC (dS/m): 0 to 1
SAR: 0 to 1
Effervescence: Violent
Reaction: Slightly alkaline or moderately alkaline

BCkk or BCk horizon

Hue: 7.5YR or 10YR
Value: 7 or 8
Chroma: 1 to 3
Texture: Sandy loam, paragravelly sandy loam, very paragravelly sandy loam, silt loam, paragravelly silt loam, or very paragravelly silt loam
Clay content: 4 to 12 percent
Rock fragments: 2 to 40 percent
Calcium carbonate equivalent: 40 to 75 percent
Identifiable secondary carbonate: 10 to 40 percent; fine and medium; masses; throughout
EC (dS/m): 1 to 5
SAR: 0 to 14

Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Papagua Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Closed depressions
Parent material: Eolian sediments of Holocene age over alluvial sediments of Quaternary age
Slope range: 0 to 1 percent
Associated soils: Czar, Colmena, Delfina, and Premont
Taxonomic class: Fine, mixed, active, hyperthermic, Typic Albaqualfs

Typical Pedon

Papagua fine sandy loam, 0 to 1 percent slopes; in Brooks County, Texas; 5.5 miles east of Falfurrias on Texas Highway 285, 2.4 miles north and west on farm road 2191, and 1,000 feet south in pasture. Premont East, Texas USGS topographic quadrangle; Latitude: 27 degrees, 15 minutes, 14 seconds North; Longitude: 98 degrees, 3 minutes, 49 seconds West; NAD 83.

A—0 to 12 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure, hard, friable; common fine roots; few fine pores; neutral; abrupt smooth boundary.

Btg1—12 to 19 inches; grayish brown (10YR 5/2) sandy clay, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium and coarse blocky; extremely hard, firm, slightly sticky; common fine roots; common, distinct clay films on faces of peds; common, medium, distinct brownish yellow (10YR 6/6) and strong brown (7.5YR 5/8) redoximorphic concentrations; few black concretions less than 5 millimeters diameter; neutral; gradual wavy boundary.

Btg2—19 to 41 inches; light brownish gray (10YR 6/2) sandy clay loam, grayish brown (10YR 5/2) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky; few fine roots; few faint clay films on faces of peds; few fine distinct yellowish brown (10YR 5/6) redox concentrations and few fine faint gray (10YR 6/1) redoximorphic depletions; few black concretions less than 5 millimeters diameter; neutral; gradual wavy boundary.

Btkg—41 to 52 inches; light gray (10YR 7/2) sandy clay loam, light brownish gray (10YR 6/2) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky; few faint clay films on faces of peds; few black concretions less than 3 millimeters diameter; few fine masses of calcium carbonate; slightly alkaline; gradual wavy boundary.

Btk—52 to 70 inches; very pale brown (10YR 8/3) sandy clay loam, very pale brown (10YR 7/3) moist; moderate fine subangular blocky structure; hard, firm; common masses and nodules of calcium carbonate; moderately alkaline; gradual smooth boundary.

BCk—70 to 80 inches; very pale brown (10YR 8/3) sandy clay loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; hard, firm; common fine and medium nodules of calcium carbonate; common fine dark concretions of iron manganese oxides; moderately alkaline.

Range in Characteristics

Depth to secondary calcium carbonates: 36 to 50 inches
Clay content: 36 to 45 percent

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 3
Texture: Fine sandy loam
Effervescence: Noneffervescent
Reaction: Slightly acid or neutral

Btg horizon

Hue: 10YR
Value: 4 to 6
Chroma: 1 to 3
Texture: Sandy clay loam or sandy clay
Redox concentrations: 5 to 30 percent; fine and medium; faint to prominent; clear and diffuse; throughout
Effervescence: Noneffervescent
Reaction: Slightly acid to neutral

Btk horizon

Hue: 10YR
Value: 6 to 8
Chroma: 2 or 3
Texture: Sandy clay loam or sandy clay
Redox concentrations: 5 to 30 percent; fine and medium; faint to prominent; clear and diffuse; throughout
Identifiable secondary carbonate: 2 to 8 percent; fine; masses and nodules; throughout
EC (dS/m): 0 to 1
SAR: 0 to 4
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

BCk horizon

Hue: 10YR
Value: 6 to 8
Chroma: 2 or 3
Texture: Sandy clay loam or sandy clay
Redox concentrations: 0 to 20 percent; fine and medium; faint to prominent; clear and diffuse; throughout
Identifiable secondary carbonate: 2 to 8 percent; fine; masses and nodules; throughout
EC (dS/m): 0 to 1
SAR: 0 to 5
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Pernitas Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Paleoterraces
Parent material: Calcareous loamy alluvium
Slope range: 1 to 5 percent
Associated soils: Colmena, Clareville, Czar, Olmedo, and Weesatche
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Typic Argiustolls

Typical Pedon

Pernitas fine sandy loam, 1 to 5 percent slopes; in Duval County, Texas; in San Diego, from the intersection of Texas Highway 44 and County Road 101, 11.2 miles west on Texas Highway 44, 6.8 miles north on County Road 330, 2.3 miles east on ranch road, and 200 feet south in rangeland. Rosita NW, Texas USGS topographic quadrangle; Latitude: 27 degrees, 53 minutes, 23 seconds North; Longitude: 98 degrees, 26 minutes, 11 seconds West; NAD 83.

A—0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2), moist; weak fine and medium subangular blocky structure; friable, slightly hard, slightly sticky, nonplastic; many very fine and fine, and common medium roots; common very fine and fine low-continuity vesicular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

Bt—5 to 11 inches; dark grayish brown (10YR 4/2) interior sandy clay loam, very dark grayish brown (10YR 3/2) interior, moist; moderate fine and medium subangular blocky structure; very firm, very hard, moderately sticky, moderately plastic; many very fine and fine, common medium, and common coarse roots; common very fine and fine moderate-continuity vesicular pores; 30 percent distinct clay films on vertical faces of peds; violently effervescent; moderately alkaline; clear smooth boundary.

Btk1—11 to 25 inches; pale brown (10YR 6/3) interior sandy clay loam, brown (10YR 5/3) interior, moist; moderate fine and medium subangular blocky structure; extremely firm, extremely hard, moderately sticky, moderately plastic; many very fine and fine, common medium, and common coarse roots; common very fine and fine moderate-continuity vesicular pores; 30 percent distinct clay films on vertical faces of peds; 1 percent fine spherical carbonate nodules and 2 percent fine and medium irregular carbonate masses; violently effervescent; moderately alkaline; clear smooth boundary.

Btk2—25 to 34 inches; pale brown (10YR 6/3) interior sandy clay loam, brown (10YR 5/3) interior, moist; moderate medium prismatic structure parting to weak fine and medium subangular blocky; extremely firm, extremely hard, moderately sticky, moderately plastic; many very fine and fine, and common medium roots; common very fine and fine moderate-continuity vesicular pores; 15 percent faint clay films on vertical faces of peds; 2 percent fine and medium irregular carbonate masses, 1 percent medium spherical carbonate nodules, and 5 percent very fine and fine spherical carbonate nodules; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—34 to 47 inches; pink (7.5YR 7/3) interior sandy clay loam, light brown (7.5YR 6/3) interior, moist; moderate medium prismatic structure parting to weak fine and medium subangular blocky; very firm, extremely hard, moderately sticky, moderately plastic; common very fine and fine, and common medium roots; common very fine and fine moderate-continuity vesicular pores; 2 percent fine irregular carbonate masses, and 8 percent very fine and fine spherical carbonate nodules; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—47 to 59 inches; pink (7.5YR 7/4) interior sandy clay loam, light brown (7.5YR 6/4) interior, moist; weak fine subangular blocky structure; very firm, very hard, moderately sticky, moderately plastic; common very fine and fine roots; many very fine and fine moderate-continuity vesicular and common medium moderate-continuity vesicular pores; 1 percent fine irregular carbonate masses, and 2 percent very fine and fine spherical carbonate nodules; violently effervescent; moderately alkaline; clear smooth boundary.

BCk—59 to 80 inches; pink (7.5YR 7/4) interior sandy clay loam, light brown (7.5YR 6/4) interior, moist; weak fine subangular blocky structure; very firm, very hard, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine moderate-continuity vesicular and common medium moderate-continuity

vesicular pores; 2 percent fine and medium irregular carbonate masses; violently effervescent; moderately alkaline.

Depth to argillic horizon: 6 to 38 inches
Depth to calcic horizon: 20 to 40 inches
Clay content: 24 to 35 percent

A horizon

Hue: 10YR
Value: 3 or 4
Chroma: 1 to 3
Texture: Fine sandy loam or sandy clay loam
Calcium carbonate equivalent: 5 to 10 percent
Effervescence: Very slight or slight
Reaction: Slightly alkaline or moderately alkaline

Bt horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 2 to 4
Texture: Sandy clay loam, clay loam, or sandy clay
Clay content: 21 to 40 percent
Calcium carbonate equivalent: 8 to 20 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

Bk horizon or (Btk horizon where present)

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 2 to 4
Texture: Clay loam or sandy clay loam
Identifiable secondary carbonates: 10 to 40 percent; medium; masses and nodules; throughout
Calcium carbonate equivalent: 15 to 50 percent and decreases with depth
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

BCk horizon

Hue: 7.5YR or 10YR
Value: 6 to 8
Chroma: 2 to 4
Texture: Clay loam or sandy clay loam
Identifiable secondary carbonates: 10 to 40 percent; medium; masses and nodules; throughout
Calcium carbonate equivalent: 15 to 50 percent and decreases with depth
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Piedras Series

Depth class: Very shallow and shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Interfluves

Parent material: Noncalcareous, loamy alluvium over petrocalcic derived from calcareous loamy alluvium of Miocene-Pliocene age
Slope range: 1 to 5 percent
Associated soils: Benavides, Cuevitas, Delmita, and Olmedo
Taxonomic class: Loamy-skeletal, mixed, active, hyperthermic, shallow, Petrocalcic Calciustepts

Typical Pedon

In an area of Piedras and Cuevitas soils, 1 to 5 percent slopes; in Duval County, Texas; from the intersection of Texas Highway 359 and Texas Highway 339 in Benavides, 10.3 miles northwest on Texas Highway 339, west 0.2 mile on private ranch road, 0.3 mile southeast and 0.4 mile south on ranch road, and 40 feet east in rangeland (fig. 21). Parilla Creek NE, Texas USGS topographic quadrangle; Latitude: 27 degrees, 41 minutes, 58 seconds North; Longitude: 98 degrees, 30 minutes, 37 seconds West; NAD 83.

A—0 to 2 inches; brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine pores; 5 percent calcrete fragments less than 6 inches in diameter; noneffervescent; neutral; clear smooth boundary.
A/Bk—2 to 10 inches; brown (7.5YR 4/4) extremely cobbly fine sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; 65 percent angular calcrete fragments 3 to 10 inches in diameter; matrix noneffervescent; slightly alkaline; abrupt smooth boundary.
Bkkm1—10 to 13 inches; very pale brown (10YR 8/2) strongly cemented calcium carbonate with a laminar cap 1/4 inch thick, very pale brown (10YR 8/3) moist; violently effervescent; strongly alkaline; clear smooth boundary.
Bkkm2—13 to 80 inches; very pale brown (10YR 8/2) weakly cemented calcium carbonate, very pale brown (10YR 8/3) moist; violently effervescent; strongly alkaline.

Range in Characteristics

Depth to petrocalcic horizon: 7 to 20 inches
Clay content: 7 to 18 percent
Coarse fragments: 35 to 80 percent strongly cemented or indurated calcrete gravels and cobbles, increasing percentage with depth

A horizon

Hue: 5YR or 7.5YR
Value: 3 or 4
Chroma: 3 to 6
Texture: Fine sandy loam
Pararock fragments: 0 to 5 percent
Base saturation: 85 to 100 percent
Calcium carbonate equivalent: 0 to 1 percent
Effervescence: Noneffervescent
Reaction: Neutral or slightly alkaline

A/Bk horizon

Hue: 5YR or 7.5YR
Value: 3 or 4
Chroma: 3 or 4
Texture: Very gravelly fine sandy loam, extremely gravelly fine sandy loam, very gravelly loam, or extremely gravelly loam
Coarse fragments: 35 to 80 percent strongly cemented or indurated calcrete pebbles and cobbles, increasing percentage with depth

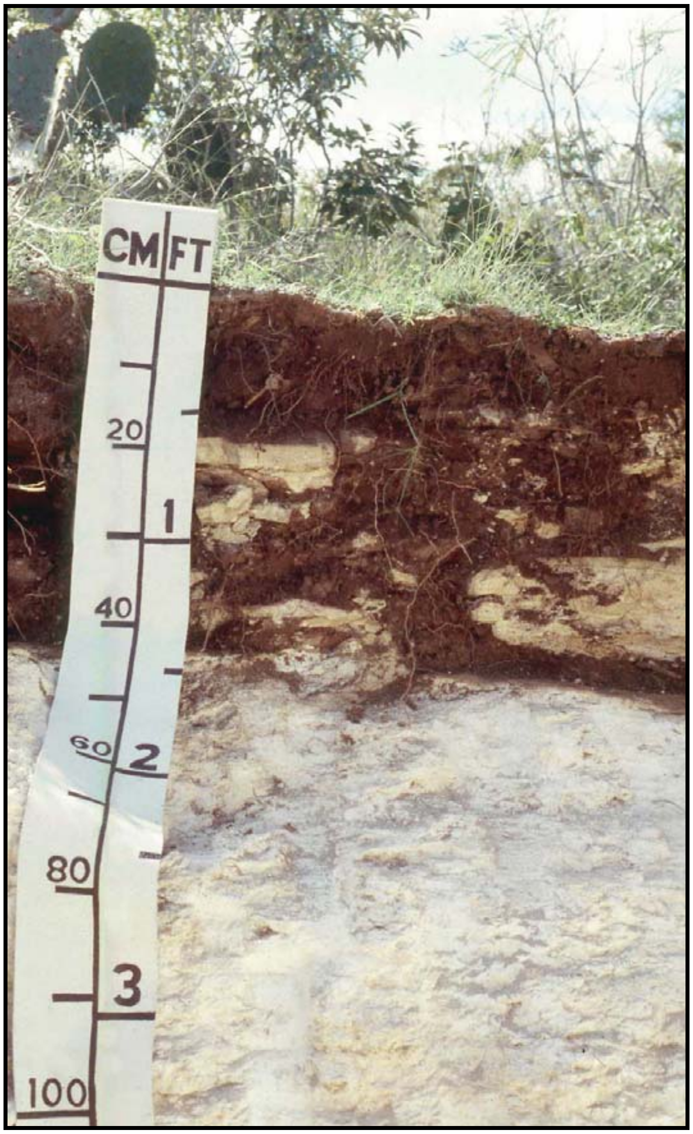

Figure 21.—Profile of Piedras fine sandy loam, 1 to 5 percent slopes. The thick layers of petrocalcic material starts at 18 inches (45 centimeters). This soil is a good source of caliche used in road construction. (Scale in CM—centimeters, and FT—feet)

Pararock fragments: 0 to 5 percent
Base saturation: 90 to 100 percent
Calcium carbonate equivalent: 0 to 2 percent
Effervescence: Noneffervescent to strong
Reaction: Moderately alkaline or strongly alkaline

Bkkm horizon

Hue: 10YR
Value: 7 or 8
Chroma: 2 or 3
Calcium carbonate equivalent: 50 to 85 percent
Effervescence: Violent
Reaction: Moderately alkaline or strongly alkaline

Premont Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Paleoterrace
Parent material: Loamy sediments over calcareous loamy alluvium of Quaternary age
Slope range: 0 to 3 percent
Associated soils: Clareville, Colmena, Czar, Delfina, and Gertrudis
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Typic Haplustalfs

Typical Pedon

Premont fine sandy loam, 0 to 3 percent slopes; in Duval County, Texas; from the intersection of Texas Highway 44 and FM 359 in San Diego, 1.15 miles south on FM 359 to FM 1329, 14.1 miles south on FM 1329 to ranch road, 1.57 miles west on ranch road, and 200 feet south in cropland (fig. 22). San Jose, Texas USGS topographic quadrangle; Latitude, 27 degrees, 32 minutes, 39.5 seconds North; Longitude: 98 degrees, 17 minutes, 33.8 seconds West; NAD 83.

Ap—0 to 8 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; hard, friable; few very fine and few medium roots; few fine and medium tubular pores; noneffervescent; slightly acid; abrupt wavy boundary.

Bt1—8 to 16 inches; brown (7.5YR 4/3) sandy clay loam, dark brown (7.5YR 3/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; common fine and few medium roots; common fine and few medium tubular pores; 30 percent distinct brown clay films on faces of peds; noneffervescent; neutral; clear smooth boundary.

Bt2—16 to 22 inches; brown (7.5YR 4/3) sandy clay loam, dark brown (7.5YR 3/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; few very fine and fine roots; few fine and medium tubular pores; 30 percent distinct brown clay films on faces of peds; noneffervescent; neutral; abrupt wavy boundary.

Bt3—22 to 34 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4), moist; strong coarse prismatic structure; very hard, very firm; common fine roots and few medium roots; few fine and few medium tubular pores; 30 percent distinct clay films on faces of peds; noneffervescent; moderately alkaline; clear wavy boundary.

Btk—34 to 37 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6), moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm; few very fine pores; few fine tubular pores; 20 percent distinct brown clay films on faces of peds; 2 percent fine prominent threads of extremely weakly cemented white (7.5YR 8/1) calcium carbonate masses with sharp boundaries in matrix and 1 percent fine prominent spherical extremely weakly cemented white (7.5YR 8/1) calcium carbonate masses with sharp boundaries in matrix; strongly effervescent; strongly alkaline; abrupt wavy boundary.

2Btk1—37 to 49 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, very firm; few fine roots; few fine and medium tubular pores; 5 percent faint pale brown clay films on surfaces along pores; 1 percent fine black (7.5YR 2.5/1) iron-manganese nodules; 14 percent fine prominent irregular extremely weakly cemented white (7.5YR 8/1) calcium carbonate masses with sharp boundaries in matrix and 20 percent medium prominent spherical moderately cemented white (7.5YR 8/1) calcium carbonate nodules with sharp boundaries between peds; violently effervescent; strongly alkaline; clear wavy boundary.

Figure 22.—Profile of Premont fine sandy loam, 0 to 3 percent slopes. This soil is used for crop and forage production in the county. The rounded shape and the downward weathering pattern of the calcium carbonates nodules at a depth of 1 meter, suggests the parent material was deposited by alluvial processes. (Scale in CM—centimeters and M—meters)

2Btk2—49 to 60 inches; reddish yellow (7.5YR 7/6) sandy clay loam, reddish yellow (7.5YR 6/6) moist; weak medium subangular blocky structure; hard, firm; few very fine and fine tubular pores; 3 percent faint light yellowish brown clay films on surfaces along pores; 5 percent very dark grayish brown (10YR 3/2) insect casts between peds; 35 percent coarse prominent irregular extremely weakly cemented white (7.5YR 8/1) calcium carbonate nodules with sharp boundaries throughout and 10 percent medium prominent irregular noncemented white (7.5YR 8/1) calcium carbonate masses with sharp boundaries between peds; violently effervescent; strongly alkaline; gradual smooth boundary.

2Bk—60 to 80 inches; reddish yellow (7.5YR 8/6) sandy clay loam, reddish yellow (7.5YR 6/6) moist; weak medium subangular blocky structure; hard, firm; few fine tubular pores; 5 percent finely disseminated weakly cemented white (7.5YR 8/1) calcium carbonate masses with diffuse boundaries throughout and 30 percent medium prominent spherical noncemented white (7.5YR 8/1) calcium carbonate masses with sharp boundaries between peds; violently effervescent; strongly alkaline.

Range in Characteristics

Depth to secondary calcium carbonates: 29 to 60 inches
Other features: Some pedons have mollic colors but do not have enough organic carbon to meet the requirements for a mollic epipedon.

A horizon

Hue: 10YR
Value: 4 or 5
Chroma: 2 or 3
Texture: Fine sandy loam
Clay content: 7 to 16 percent
EC: 0 to 2
SAR: 0 to 6
Effervescence: Noneffervescent
Reaction: Strongly acid to neutral

Bt horizon

Hue: 7.5YR or 10YR
Value: 3 to 6
Chroma: 2 to 4
Texture: Fine sandy loam or sandy clay loam
Clay content: 17 to 32 percent
Clay films: 10 to 30 percent, along faces of peds, faint to distinct
EC: 0 to 2
SAR: 0 to 6
Effervescence: Noneffervescent to slight
Reaction: Slightly acid to moderately alkaline

Btk horizon

Hue: 7.5YR or 10YR
Value: 3 to 6
Chroma: 3 to 6
Texture: Sandy clay loam
Clay content: 20 to 32 percent
Clay films: 10 to 25 percent, along faces of peds, faint to distinct
EC: 0 to 2
SAR: 0 to 6
Effervescence: Slight to strong
Reaction: Neutral to strongly alkaline

2Btk horizon

Hue: 7.5YR or 10YR
Value: 4 to 7
Chroma: 3 to 6
Texture: Sandy clay loam
Clay content: 20 to 26 percent
Clay films: 3 to 10 percent; faint; on surfaces along pores

Identifiable secondary carbonates: 5 to 45 percent; fine to coarse; threads, masses, and nodules; infused in matrix and in matrix along faces of peds
EC: 0 to 2
SAR: 0 to 4
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

2Bk horizon

Hue: 7.5YR or 10YR
Value: 4 to 8
Chroma: 3 to 6
Texture: Sandy clay loam
Clay content: 20 to 26 percent
Identifiable secondary carbonates: 5 to 45 percent; fine to coarse; threads, masses, and nodules; infused in matrix and in matrix along faces of peds
EC: 0 to 2
SAR: 0 to 4
Effervescence: Slight to violent
Reaction: Slightly alkaline to strongly alkaline

Randado Series

Depth class: Very shallow and shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Ridges and interfluves
Parent material: Loamy alluvium that has been partially reworked by wind over the Goliad Formation (petrocalcic)
Slope range: 0 to 3 percent
Associated soils: Cuevitas, Delmita, Piedras, and Weesatche
Taxonomic class: Loamy, mixed, superactive, hyperthermic, shallow, Petrocalcic Paleustalfs

Typical Pedon

Randado fine sandy loam, in an area of Delmita-Randado complex, 0 to 3 percent slopes; in Jim Hogg County, Texas; from the intersection of Texas Highway 16 and Texas Highway 285 in Hebbronville, 3 miles south on Texas Highway 16 to Farm Road 3073, 16 miles west on Farm Road 3073 to Farm Road 649, 0.2 mile south on Farm Road 649, and 200 feet east in rangeland. Thompsonville, Texas USGS topographic quadrangle; Latitude: 27 degrees, 14 minutes, 04 seconds North; Longitude: 98 degrees, 55 minutes, 58 seconds West; NAD 83.

A1—0 to 2 inches; reddish brown (5YR 5/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; hard, very friable, slightly sticky, and nonplastic; porous beneath the thin surface crust; few angular petrocalcic fragments; few rounded chert pebbles; slightly acid; clear smooth boundary.
A2—2 to 8 inches; reddish brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; hard, very friable; slightly sticky and nonplastic; many fine pores; few angular petrocalcic fragments; few rounded chert pebbles; slightly acid; clear wavy boundary.
Bt—8 to 16 inches; yellowish red (5YR 4/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak medium prismatic structure parting to weak fine subangular blocky; hard, friable, slightly sticky and nonplastic; many fine pores; few root channels; few clay bridges and few faint clay films in pores and lining root channels; neutral; abrupt wavy boundary.

Bkkm1—16 to 20 inches; pinkish white (5YR 8/2) strongly cemented calcium carbonate; weak platy to fractured in upper 2 to 3 inches, massive below; upper surface has laminar cap; moderately alkaline; gradual wavy boundary.

Bkkm2—20 to 80 inches; white (10YR 8/1) weakly cemented calcium carbonate; massive but contains a few fractures; moderately alkaline.

Range in Characteristics

Depth to argillic horizon: 4 to 15 inches
Depth to petrocalcic horizon: 8 to 20 inches

A horizon

Hue: 2.5YR to 7.5YR
Value: 4 to 6
Chroma: 4 to 6
Texture: Fine sandy loam
Clay content: 8 to 18 percent
Coarse fragments: 0 to 5 percent angular petrocalcic fragments; 0 to 15 percent rounded chert pebbles
Pararock fragments: 0 to 2 percent
Base saturation: 75 to 90 percent
Calcium carbonate equivalent: 0 to 2 percent
EC (dS/m): 0 to 1
Gypsum: 0 to 1 percent
Effervescence: Noneffervescent
Reaction: Slightly acid to slightly alkaline

Bt horizon

Hue: 2.5YR to 7.5YR
Value: 3 to 6
Chroma: 4 to 6
Texture: Fine sandy loam or sandy clay loam
Clay content: 15 to 27 percent
Coarse fragments: 0 to 25 percent rounded chert pebbles; 0 to 5 percent angular petrocalcic fragments
Pararock fragments: 0 to 5 percent
Base saturation: 80 to 95 percent
Calcium carbonate equivalent: 0 to 2 percent
EC (dS/m): 0 to 1
Gypsum: 0 to 1 percent
Effervescence: Noneffervescent or very slight
Reaction: Slightly acid to slightly alkaline

Bkkm1 horizon

Hue: 5YR to 10YR
Value: 7 or 8
Chroma: 1 to 3
Base saturation: 100 percent
Calcium carbonate equivalent: 50 to 90 percent
Effervescence: Violent
Reaction: Moderately alkaline

Bkkm2 horizon

Hue: 7.5YR or 10YR
Value: 7 or 8

Chroma: 1 to 3
Texture: Fine sandy loam or loam
Coarse fragments: 0 to 5 percent rounded chert pebbles and cobbles
Pararock fragments: 0 to 5 percent
Base saturation: 100 percent
Calcium carbonate equivalent: 60 to 90 percent
EC (dS/m): 0 to 1
Gypsum: 0 to 1 percent
Effervescence: Violent
Reaction: Moderately alkaline

Realitos Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Enclosed depressions
Parent material: Clayey over loamy alluvium derived from the Goliad Formation
Slope range: 0 to 1 percent
Associated soils: Alet, Premont, Olmedo, Pernitas, Tiocano, and Weesatche
Taxonomic class: Fine, smectitic, hyperthermic, Typic Haplusterts

Typical Pedon

Realitos clay, 0 to 1 percent slopes; in Duval County, Texas; from the intersection of Texas Highway 359 and Texas Highway 339 in Benavides, 8.6 miles south on Texas Highway 339, 0.7 mile west on private ranch road, 0.8 mile north on field road, and 100 feet east in depression (fig. 23). Concepcion NW, Texas USGS topographic quadrangle; Latitude: 27 degrees, 28 minutes, 55 seconds North; Longitude: 98 degrees, 25 minutes, 11 seconds West; NAD 83.

A—0 to 6 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate fine and medium subangular blocky and granular structure; extremely hard, very firm, very sticky and very plastic; common fine and medium and few coarse roots; few fine pores; noneffervescent; slightly acid; clear wavy boundary.

Bss1—6 to 27 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; strong fine and medium angular blocky structure; extremely hard, very firm, very sticky and very plastic; common distinct slickensides; common fine and few medium roots; few fine pores; noneffervescent; neutral; gradual wavy boundary.

Bss2—27 to 37 inches; gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; strong fine and medium angular blocky structure; extremely hard, very firm, very sticky, and very plastic; common distinct slickensides; few fine roots; noneffervescent; neutral; clear wavy boundary.

Bss3—37 to 49 inches; gray (10YR 6/1) clay, gray (10YR 5/1) moist; strong fine and medium angular blocky structure; extremely hard, very firm, very sticky, and very plastic; common distinct slickensides and pressure faces; few fine roots; noneffervescent; slightly alkaline; clear wavy boundary.

Bkss—49 to 80 inches; light brownish gray (10YR 6/2), clay loam, grayish brown (10YR 5/2) moist; weak fine and medium angular blocky structure; extremely hard, very firm, sticky, and plastic; few distinct slickensides; 5 percent fine and medium masses of calcium carbonate; matrix is noneffervescent; slightly effervescent; moderately alkaline.

Range in Characteristics

Depth to slickensides: 5 to 20 inches
Depth to secondary calcium carbonate: 30 to 75 inches
Depth to calcic horizon: 40 to 60 inches

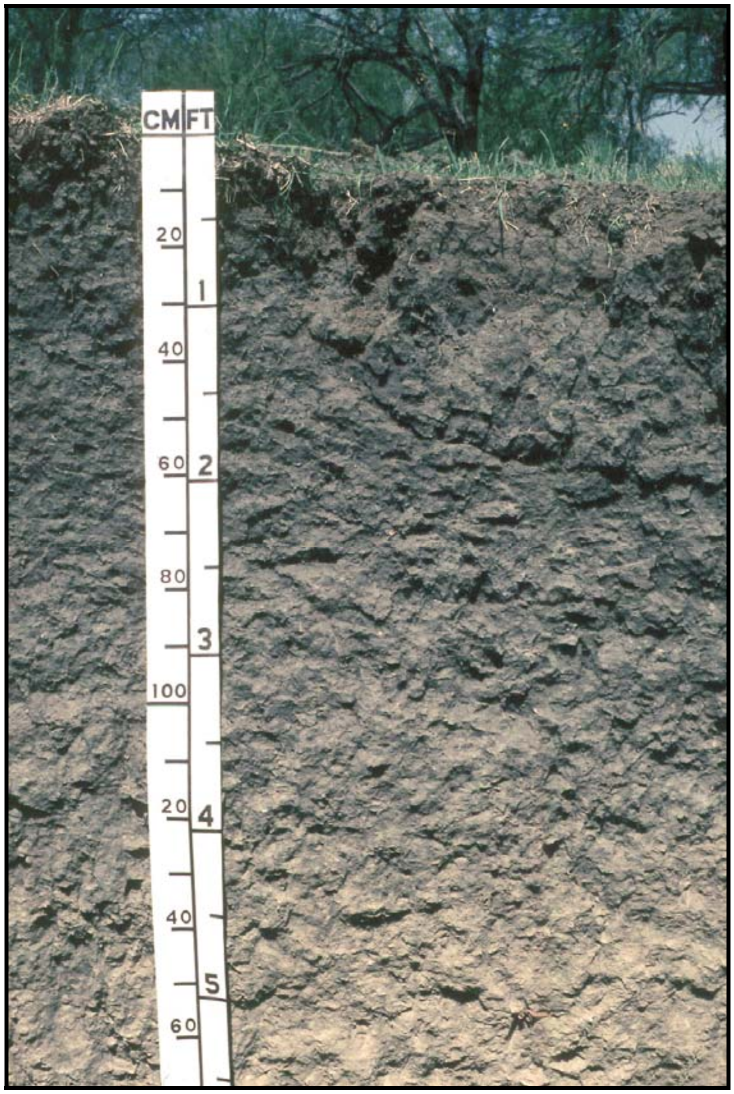

Figure 23.—Profile of Realitos clay, 0 to 1 percent slopes. This clayey soil is found in depressions. Realitos soils are used primarily for wildlife habitat and livestock grazing. (Scale in CM—centimeters, and FT—feet)

Depth to endosaturation: 20 to 30 inches for 1 to 3 weeks following prolonged rains. Reduction occurs in this zone in 2 to 4 years out of 10 years. Does not have aquic conditions in most years.
Depth to episaturation: 0 to 10 inches; the soil has episaturation for brief periods following heavy rains.
Redoximorphic features: Ranges from 0 to 5 percent throughout in the form of concentrations and depletions

A horizon

Hue: 10YR or 2.5Y
Value: 2 to 4
Chroma: 1
Texture: Clay loam or clay
Clay content: 35 to 45 percent

Coarse fragments: 0 to 2 percent gravel
Base saturation: 90 to 100 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 2 percent
SAR: 0 to 4
Effervescence: Noneffervescent to slight
Reaction: Slightly acid to slightly alkaline

Bss horizon or Bw horizon (where present)

Hue: 10YR or 2.5Y
Value: 3 to 6
Chroma: 1 to 3
Texture: Clay
Clay content: 40 to 60 percent
Coarse fragments: 0 to 5 percent gravel
Base saturation: 95 to 100 percent
Calcium carbonate equivalent: 2 to 10 percent
EC (dS/m): 0 to 2
Gypsum: 0 to 6 percent
SAR: 0 to 6
Effervescence: Noneffervescent to slight
Reaction: Neutral to moderately alkaline

Bkss horizon

Hue: 10YR
Value: 4 to 6
Chroma: 1 to 3
Texture: Clay loam or clay
Clay content: 35 to 60 percent
Coarse fragments: 0 to 5 percent gravel
Base saturation: 100 percent
Calcium carbonate equivalent: 15 to 35 percent
Visible calcium carbonate: 5 to 10 percent; fine; thread-shaped masses; throughout
EC (dS/m): 2 to 8
Gypsum: 2 to 6 percent
SAR: 2 to 10
Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline or moderately alkaline

BC or BCk horizons (where present)

Hue: 10YR
Value: 4 to 6
Chroma: 1 to 3
Texture: Sandy clay loam, sandy clay, or clay loam
Clay content: 30 to 38 percent
Coarse fragments: 0 to 5 percent gravel
Base saturation: 100 percent
Calcium carbonate equivalent: 0 to 18 percent
Visible calcium carbonate: 0 to 10 percent; fine; thread-shaped masses; throughout
EC (dS/m): 2 to 8
Gypsum: 2 to 6 percent
SAR: 2 to 10
Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline or moderately alkaline

Salco Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Interfluves or high stream terraces
Parent material: Loamy, calcareous, alluvium and/or residuum from tuffaceous sandstone of Miocene age
Slope range: 1 to 5 percent
Associated soils: Houla, Lomart, and Mirasol
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Aridic Argiustolls

Typical pedon

Salco sandy clay loam, 1 to 5 percent slopes; in Duval County, Texas; from the intersection of Texas Highway 16 and U.S. Highway 59 in Freer, 7.8 miles north, 1.3 miles west, 0.4 mile north and 0.55 mile northeast on ranch road, and 20 feet south of road in rangeland (fig. 24). Loma Alta, Texas USGS topographic quadrangle; Latitude 28 degrees, 00 minutes, 32 seconds North; Longitude 98 degrees, 36 minutes, 35 seconds West; NAD 83.

A—0 to 7 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to weak fine subangular blocky; hard friable; few fine roots; common fine pores; few broken snail shell fragments; about 1 percent by volume fine masses of calcium carbonate; few root channels and insect tunnels; slightly effervescent moderately alkaline; clear smooth boundary.

Bt1—7 to 16 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; few fine roots; common fine pores; few faint clay films; few broken snail shell fragments; few root channels and insect tunnels; about 1 percent by volume fine masses of calcium carbonate; about 5.0 percent calcium carbonate equivalent; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bt2—16 to 26 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; few fine roots; common fine pores; common distinct clay films on surfaces of peds; few broken snail shell fragments; few root channels and insect tunnels; about 1 percent by volume fine masses of calcium carbonate; about 8 percent calcium carbonate equivalent; slightly effervescent; moderately alkaline; gradual smooth boundary.

Btk1—26 to 38 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; hard, friable; few fine roots; common fine pores; few distinct clay films on surfaces of peds; few broken snail shell fragments; few root channels and insect tunnels; about 2 percent by volume fine masses of calcium carbonate; about 15 percent calcium carbonate equivalent; strongly effervescent; moderately alkaline; gradual smooth boundary.

Btk2—38 to 52 inches; very pale brown (10YR 7/4) sandy clay loam, light yellowish brown (10YR 6/4) moist; weak fine and medium subangular blocky structure; hard, friable; few fine roots; common fine pores; few faint clay films; few broken snail shell fragments; few fine siliceous pebbles; few fine sandstone fragments; about 2 percent by volume fine masses of calcium carbonate; about 18 percent calcium carbonate equivalent; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk—52 to 80 inches; very pale brown (10YR 7/4) loam, light yellowish brown (10YR 6/4) moist; massive; hard, friable; common fine pores; few fine sandstone fragments; about 2 percent by volume masses of calcium carbonate; about 22 percent calcium carbonate equivalent; violently effervescent; moderately alkaline.

Figure 24.—Profile of Salco sandy clay loam, 1 to 5 percent slopes. This soil often occurs in water receiving positions. (Scale in CM—centimeters, and FT—feet)

Range in Characteristics

Thickness of the epipedon: 10 to 17 inches
Depth to argillic horizon: 8 to 12 inches
Clay content: 20 to 32 percent
Coarse fragments: 0 to 5 percent

A horizon

Hue: 10YR
Value: 4 or 5
Chroma: 2 or 3
Texture: Sandy clay loam
Clay content: 15 to 23 percent

Calcium carbonate equivalent: 1 to 3 percent
Identifiable secondary carbonate: 0 to 1 percent; fine; masses; throughout
EC (dS/m): 0 to 1
SAR: 0 to 2
Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline or moderately alkaline

Bt and Btk horizons

Hue: 7.5YR or 10YR
Value: 5 to 7
Chroma: 3 to 6
Texture: Clay loam or sandy clay loam
Clay content: 22 to 32 percent
Calcium carbonate equivalent: 4 to 18 percent
Identifiable secondary carbonate: 0 to 3 percent; fine; masses; throughout
EC (dS/m): 0 to 2
SAR: 0 to 3
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Bk horizon

Hue: 7.5YR or 10YR
Value: 6 or 7
Chroma: 3 or 4
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 12 to 22 percent
Calcium carbonate equivalent: 15 to 25 percent
Identifiable secondary carbonate: 0 to 2 percent; fine; masses; throughout
EC (dS/m): 0 to 1
SAR: 0 to 5
Effervescence: Slight or strong
Reaction: Slightly alkaline or moderately alkaline

Sarita Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Dune on sandsheet with low vegetation
Parent material: Eolian sands of Holocene age over alluvium of Quaternary age
Slope range: 0 to 5 percent
Associated soils: Comitas, Delfina, and Nueces
Taxonomic class: Loamy, mixed, active, hyperthermic, Grossarenic Paleustalfs

Typical Pedon

Sarita fine sand, 0 to 5 percent slopes; in Hidalgo County, Texas; from the intersection of U.S. Highway 281 and Texas Highway 186 in Linn, 6.6 miles north on U.S. Highway 281 to ranch road, 1.4 miles east on ranch road, and 100 feet south in rangeland (fig. 25). Linn NE, Texas USGS topographic quadrangle; Latitude: 26 degrees, 38 minutes, 39 seconds North; Longitude: 98 degrees, 05 minutes, 26 seconds West; NAD 83.

A—0 to 8 inches; light brownish gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose, very friable; common fine roots; slightly acid; clear smooth boundary.

Figure 25.—Profile of Sarita fine sand, 0 to 5 percent slopes. In this profile the sandy surface layer extends to about 64 inches (164 cm). Below that is a sandy clay loam subsoil. (Scale in CM—centimeters, and FT—feet)

E—8 to 48 inches; very pale brown (10YR 7/3) fine sand, brown (10YR 5/3) moist; single grain; loose, very friable; few fine roots; slightly acid; abrupt smooth boundary.

2Bt1—48 to 52 inches; pale brown (10YR 6/3) fine sandy loam, grayish brown (10YR 5/2) moist; moderate coarse prismatic structure parting to weak medium angular blocky; extremely hard, friable; few distinct clay films on surfaces of peds; common fine pores; few fine and medium faint yellowish brown (10YR 5/4) redoximorphic concentrations; slightly acid; clear smooth boundary.

2Bt2—52 to 58 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist, moderate coarse prismatic structure parting to weak medium angular blocky; extremely hard, friable; common distinct clay films on surfaces of peds; few fine and medium pores; many medium and coarse distinct strong brown (7.5YR 5/6) and a few fine distinct red (2.5YR 4/6) redoximorphic concentrations; neutral; gradual smooth boundary.

2Bt3—58 to 80 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; weak medium angular blocky structure; very hard, friable; common faint clay films on vertical surfaces of peds; moderately alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Depth to argillic horizon: 40 to 60 inches
Clay content: 18 to 35 percent
CEC/clay ratio: 0.40 to 0.60

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 6
Chroma: 2 to 4
Texture: Fine sand
Reaction: Slightly acid or neutral

E horizon

Hue: 7.5YR or 10YR
Value: 5 to 8
Chroma: 2 to 4
Texture: Fine sand or loamy fine sand
Reaction: Slightly acid or neutral

2Bt horizon

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: Fine sandy loam or sandy clay loam
Clay content: 12 to 34 percent; with the highest clay contents in the upper few inches of the 2Bt horizon and in a second maximum, or clay bulge expressed graphically, at depths of 60 to 80 inches
Clay films: Few to common; faint or prominent; on faces of peds, lining of pores, and bridging of sand grains
Redox concentrations: Few to many, medium or coarse; distinct or prominent
Redox depletions: None to common; medium or coarse; faint or prominent; gray depletions; occur in some pedons
Reaction: Moderately acid to moderately alkaline

Sinton Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Floodplain and floodplain step
Parent material: Loamy alluvium
Slope range: 0 to 1 percent
Associated soils: Colmena, Clareville, Czar, Pernitas, Premont, and Weesatche
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Cumulic Haplustolls

Typical Pedon

Sinton sandy clay loam, 0 to 1 percent slopes, occasionally flooded; in Jim Wells County, Texas; from the intersection of Texas State Highway 359 and Farm Road 624 in Orange Grove, 3.4 miles north on State Highway 359 to intersection with Farm Road 534,

2.7 miles northwest on Farm Road 534, and 150 feet southwest in rangeland on the south side of Pernitas Creek. Sandia, Texas USGS topographic quadrangle; Latitude: 28 degrees, 01 minutes, 22.8 seconds North; Longitude: 97 degrees, 56 minutes, 27.1 seconds West; NAD 83.

A1—0 to 10 inches; very dark gray (10YR 3/1) sandy clay loam, black (10YR 2/1) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky; common fine and medium roots; common fine pores; few wormcasts; few fragments of snail shell; slightly effervescent; moderately alkaline; clear smooth boundary.

A2—10 to 34 inches; dark gray (10YR 4/1) sandy clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; hard, friable, slightly sticky; few fine and medium roots; common fine and medium pores; common wormcasts; few fragments of snail shell; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bw1—34 to 50 inches; light brownish gray (10YR 6/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; hard, friable; slightly sticky; few thin strata of loamy fine sand; few fragments of snail shell; few threads of calcium carbonate; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bw2—50 to 80 inches; light gray (10YR 7/2) sandy clay loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky; few threads of calcium carbonate; strongly effervescent; moderately alkaline.

Range in Characteristics

Solum thickness: More than 60 inches
Thickness of the mollic epipedon: 20 to 40 inches
Clay content: 20 to 35 percent
Other features: Thin strata of contrasting textures are at a depth of 25 to 50 inches

A horizon

Hue: 7.5YR or 10YR
Value: 3 or 4
Chroma: 1 to 3
Texture: Loam, clay loam, or sandy clay loam
Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline or moderately alkaline

Bw horizon or (Bk horizon where present)

Hue: 7.5YR or 10YR
Value: 4 to 8
Chroma: 1 to 6
Texture: Loamy fine sand, fine sandy loam, loam, sandy clay loam, or clay loam, with thin discontinuous bedding planes and lenses of various textures
Identifiable secondary carbonate: 0 to 3 percent; fine and medium; films and threads; throughout
Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline or moderately alkaline
Other features: Some pedons have stratified C horizon below 60 inches

Tela Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Drainageways

Parent material: Loamy alluvium
Slope range: 0 to 1 percent
Associated soils: Aguilares, Houla, Moglia, and Salco
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Aridic Argiustolls

Typical Pedon

Tela sandy clay loam, 0 to 1 percent slopes, rarely flooded; in Jim Hogg County, Texas; from the intersection of Texas Highway 16 and Farm Road 649 in Randado, 14.2 miles south on Farm Road 649 to county road, 0.8 mile west on county road, and 175 feet north of county road in rangeland (fig. 26). Cuevitas SW, Texas USGS topographic quadrangle; Latitude: 26 degrees, 51 minutes, 46 seconds North; Longitude: 98 degrees, 54 minutes, 38 seconds West; NAD 83.

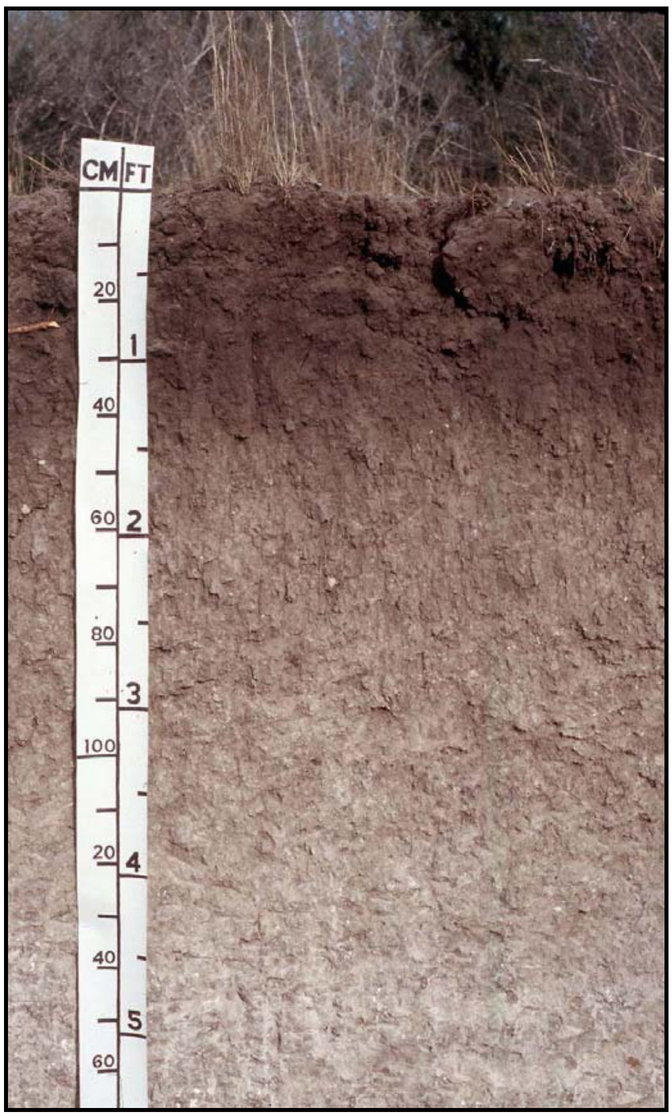

Figure 26.—Profile of Tela sandy clay loam, 0 to 1 percent slopes, rarely flooded. This soil occurs in water receiving positions. The productivity of this soil is limited mostly by the droughty nature of the South Texas climate. Tela soils are rarely flooded by overland flow as a result of high rainfall, often associated with tropical events. (Scale in CM—centimeters, and FT—feet)

A—0 to 9 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; hard, friable; few fine pores; slightly alkaline; clear smooth boundary.

Bt—9 to 16 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate fine and medium blocky and angular blocky structure; hard, friable; few fine pores; 5 percent clay films on ped surfaces; slightly alkaline; gradual smooth boundary.

Btk—16 to 32 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; moderate fine and medium blocky and angular blocky structure; hard, friable; few fine pores; 5 percent clay films; 4 percent films and threads of secondary carbonates; calcareous, moderately alkaline; clear smooth boundary.

Bk—32 to 80 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) weak fine and medium subangular blocky structure; massive; hard, friable; 2 percent soft masses of calcium carbonate; few rounded pebbles; calcareous; moderately alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Depth to secondary carbonates: 12 to 34 inches

A horizon

Hue: 10YR
Value: 3 to 5
Chroma: 2 or 3
Texture: Sandy clay loam
Effervescence: Noneffervescent or very slight
Reaction: Neutral or slightly alkaline

Bt horizon

Hue: 10YR
Value: 4 to 6
Chroma: 2 or 3
Texture: Sandy clay loam or clay loam
Effervescence: Noneffervescent or very slight
Reaction: Neutral or slightly alkaline

Btk horizon

Hue: 10YR
Value: 6 to 8
Chroma: 2 or 3
Texture: Sandy clay loam or clay loam
Effervescence: Noneffervescent to slight
Reaction: Slightly alkaline

Bk horizon

Hue: 10YR
Value: 6 to 8
Chroma: 2 or 3
Texture: Loam, sandy clay loam, or clay loam
Effervescence: Slight or strong
Reaction: Slightly alkaline

Tiocano Series

Depth class: Very deep
Drainage class: Somewhat poorly drained

Permeability: Very slow
Landform: Closed depressions
Parent material: Clayey sediments of Pleistocene age
Slope range: 0 to 1 percent
Associated soils: Aguilares, Brennan, Moglia, and Tela
Taxonomic class: Fine, smectitic, hyperthermic, Udic Haplusterts

Typical Pedon

Tiocano clay, 0 to 1 percent slopes, ponded; in Starr County, Texas; from the intersection of U.S. Highway 83 and Farm Road 755 in Rio Grande City, 13.6 miles northeast on Farm Road 755, 9.3 miles east on Farm Road 490, 3.6 miles north on Farm Road 2844, and 125 feet east in pasture. Rincon, Texas USGS topographic quadrangle; Latitude: 26 degrees, 33 minutes, 50 seconds North; Longitude: 98 degrees, 32 minutes, 24 seconds West; NAD 83.

A—0 to 10 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate fine angular blocky structure; when dry, upper 2 inches has very fine and fine granular structure; very hard, very firm, very sticky, plastic; few fine roots; few fine and medium pores; few fine reddish brown iron concentrations along old root channels; moderately alkaline; gradual wavy boundary.

Bss1—10 to 32 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate coarse and medium angular blocky structure; very hard, very firm, very sticky, very plastic; few fine roots; few fine pores; few fine reddish brown iron concentrations in upper part; wedge-shaped peds have long axes tilted about 25 degrees from horizontal, and have shiny faces; common distinct slickensides; moderately alkaline; diffuse wavy boundary.

Bss2—32 to 50 inches; gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; moderate medium angular blocky structure; very hard, very firm, very sticky, very plastic; many distinct wedge-shaped peds that have their axes tilted about 25 to 45 degrees from the horizontal; peds have shiny faces; many distinct slickensides; few dark gray streaks along old cracks; strongly effervescent; moderately alkaline; gradual wavy boundary.

BCk—50 to 80 inches; light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure; very hard, very firm, sticky, plastic; few masses and nodules of calcium carbonate; strongly effervescent; moderately alkaline.

Range in Characteristics

Surface cracks: The soil, when dry, has cracks 1/4 inch to about 4 inches wide at the surface that extend to depths of 30 to 40 inches. The amplitude of waviness between the microhighs and the microlows is 14 to 50 inches.

Other features: Some pedons have up to 6 inches of loamy overwash sediments on the surface. Bss horizons contain 25 to 50 percent slickensides. 2BC or 2C horizons of mottled loamy and sandy sediments are below 60 inches in some pedons.

A horizon

Hue: 10YR
Value: 2 to 5
Chroma: 1
Texture: Clay
Effervescence: Noneffervescent to slight
Reaction: Neutral to moderately alkaline

Bss horizon and Bkss horizon (where present)

Hue: 10YR or 2.5Y
Value: 2 to 6

Chroma: 1
Texture: Sandy clay, silty clay, or clay
Clay content: 40 to 60 percent
Identifiable secondary carbonate: 0 to 5 percent; fine; masses; throughout
Effervescence: Noneffervescent to strong
Reaction: Neutral to moderately alkaline

BCk horizon

Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 1 to 3
Texture: Sandy clay, clay loam, silty clay, or clay
Clay content: 40 to 60 percent
Identifiable secondary carbonate: 0 to 5 percent; fine; masses; throughout
Effervescence: Noneffervescent to strong
Reaction: Neutral to moderately alkaline

2C or 2Ck horizons (where present)

Hue: 10YR or 2.5Y
Value: 5 to 7
Chroma: 1 to 3
Texture: Fine sandy loam, loam, or sandy clay loam
Clay content: 15 to 25 percent
Identifiable secondary carbonate: 0 to 5 percent; fine; masses; throughout
Effervescence: Noneffervescent to strong
Reaction: Neutral to moderately alkaline

Weesatche Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Paleoterraces or hillslopes
Parent material: Calcareous loamy alluvium of the Pleistocene age
Slope range: 1 to 5 percent
Associated soils: Alet, Benavides, Colmena, Clareville, Czar, and Pernitas
Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic, Typic Argiustolls

Typical Pedon

Weesatche sandy clay loam, 1 to 3 percent slopes; in DeWitt County, Texas; from the intersection of Texas Highway 72 and Texas Highway 119 in Yorktown, 4.8 miles south on Texas Highway 119, 3 miles south and 2.4 miles southwest on a county road, and 20 feet northwest of right-of-way in rangeland. Runge SE, Texas USGS topographic quadrangle; Latitude: 28 degrees, 51 minutes, 55.6 seconds North; Longitude: 97 degrees, 32 minutes, 16.8 seconds West; NAD 83.

A—0 to 8 inches; dark gray (10YR 4/1) sandy clay loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky and granular structure; slightly hard, friable; common fine roots; common fine pores; noneffervescent; slightly alkaline; clear smooth boundary.

Bt1—8 to 17 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure parting to weak fine subangular blocky; very hard, firm; common fine roots; few distinct clay films on surface of peds; 5 percent fine siliceous pebbles; very slightly effervescent; moderately alkaline; gradual smooth boundary.

Bt2—17 to 30 inches; reddish brown (5YR 5/3) sandy clay loam, reddish brown (5YR 4/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; extremely hard, very firm; few fine roots between peds; common medium distinct red (2.5YR 5/6) masses of iron accumulation; common prominent clay films on surface of peds and in pores; 10 percent fine siliceous pebbles; very slightly effervescent; moderately alkaline; gradual smooth boundary.

Bk1—30 to 38 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; weak medium angular blocky structure; very hard, firm; few fine roots; few medium distinct red (2.5YR 5/6) masses of iron accumulation; 10 percent masses and concretions of calcium carbonate; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—38 to 50 inches; pink (7.5YR 7/4) loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; very hard, friable; 25 percent masses of calcium carbonate; violently effervescent; moderately alkaline; gradual smooth boundary.

BCk—50 to 80 inches; very pale brown (10YR 8/2) loam thinly stratified with weakly cemented sandstone in the lower part; weak coarse subangular blocky structure; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to argillic: 6 to 30 inches
Depth to calcic: 25 to 40 inches
Depth to secondary carbonates: 20 to 36 inches
Coarse fragments: 0 to 15 percent siliceous gravels
Clay content: 20 to 32 percent

A horizon

Hue: 7.5YR or 10YR
Value: 2 to 5
Chroma: 1 to 3
Texture: Fine sandy loam, loam, or sandy clay loam
Effervescence: Noneffervescent
Reaction: Neutral or slightly alkaline

Upper Bt horizon

Hue: 5YR to 10YR
Value: 3 to 5
Chroma: 1 to 4
Texture: Sandy clay loam, sandy clay, or clay loam
Clay content: 25 to 38 percent
Redox concentrations: None to common; brown, yellow, or red
Effervescence: Noneffervescent
Reaction: Slightly alkaline or moderately alkaline

Lower Bt horizon

Hue: 5YR to 10YR
Value: 3 to 5
Chroma: 1 to 4
Texture: Sandy clay loam or clay loam
Clay content: 20 to 35 percent
Redox concentrations: none to common; brown, yellow, or red
Effervescence: Noneffervescent or very slight
Reaction: Slightly alkaline or moderately alkaline

Bk horizon or Btk horizon (where present)

Hue: 5YR to 10YR
Value: 3 to 7
Chroma: 2 to 8
Texture: Sandy clay loam, silt loam, loam, or clay loam
Clay content: 20 to 35 percent
Calcium carbonate equivalent: 5 to 65 percent
Effervescence: Slight to violent
Reaction: Slightly alkaline or moderately alkaline

BCk horizon

Hue: 5YR to 10YR
Value: 3 to 8
Chroma: 2 to 6
Texture: Fine sandy loam, loam, sandy clay loam, or clay loam
Calcium carbonate equivalent: 10 to 65 percent
Effervescence: Strong or violent
Reaction: Slightly alkaline or moderately alkaline

Formation of the Soils

In this section, the factors of soil formation to include parent material, climate, plant and animal life, relief, and time are discussed and are related to the formation of the soils in Duval County. Also, the processes of horizon differentiation and the surface geology of the counties are described.

Factors of Soil Formation

Soil is formed by the action of soil-forming processes on material deposited or accumulated by geological forces. The characteristics of a soil depend on the physical and mineralogical composition of the parent material, the climate under which the soil material has accumulated and has existed since accumulation, the plant and animal life on and in the soil, the relief, and the length of time the forces of soil development have acted on the soil material.

Climate and living organisms are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and living organisms are conditioned by relief. The parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for changing the parent material into soil. Generally, a long time is needed for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other factors.

Parent Material

Parent material is the unconsolidated organic and inorganic material in which a soil forms. The parent material determines the physical and chemical limits of the soil. For example, the Olmedo and Piedras soils have cemented calcareous subsurface layers. The parent material for Olmedo and Peidras is weathered calcareous sandstone with additions of calcium carbonate from wind and alluvium. The Realitos and Tiocano soils have clay surface layers. The parent material for Realitos and Tiocano soils is clayey playa deposits

The Nueces and Sarita soils formed from windblown sandy deposits. The thick sandy surfaces overlie clayey material that was probably deposited by water. The parent material of these soils did not contain calcium carbonate and these two soils are not calcareous like the Olmedo and Piedras soils.

Climate

Duval County has a subhumid climate with mild, dry winters and hot summers. Low rainfall and high evaporation rate, temperature, and wind are some of the climatic factors which influence soil formation.

The variable rainfall pattern causes the soil to be alternately wet and dry. When a clayey soil such as Tiocano becomes dry, it cracks. Animals, rainfall, and wind deposit surface soil in the cracks. During rains the cracks fill with water, the soil swells as it gets wet, and the cracks close. This alternate shrinking and swelling upon drying and wetting

causes a rise and fall in the soil surface, and churning or mixing of the soil that has been termed "self swallowing" (Soil Survey Staff, 1998). The cracks in these soils, initially, allow the soil to take in water rapidly and wet deeply. Deep soil development and gilgai microrelief are the results of these processes. Water moving through the soil can carry clay particles downward in suspension from the surface layer. The clay particles are deposited in the subsoil as the water flow ceases. As clay accumulates, permeability decreases, slowing future water movement, and deposition of clay accelerates. Papagua soils have clay accumulations in their subsoils.

Rainfall also leaches minerals from the upper layers and deposits them in the lower layers. As a result, Colmena, Weesatche and many other soils have a layer in which calcium carbonate has accumulated.

Also, the accumulation of organic matter is affected by temperature and moisture. Low rainfall and high temperatures limit the vegetative growth and accumulation of organic matter in the soils. However, in those areas where more soil moisture is present, such as floodplains and depressional areas, the vegetative production and organic matter contents are higher than the surrounding upland soils. Near surface soil temperatures are lower where there is more vegetation, and the rate of decomposition of organic matter is generally slower.

Plant and Animal Life

Plants, animals, earthworms, insects, and micro-organisms are important factors in the formation of soils. The amount of organic matter and nitrogen in the soil, gains or losses in plant nutrients, and changes in soil structure and porosity are among the effects of living organisms.

Vegetation, predominantly grasses and brush, has played a major role in soil formation in Duval County. Decayed roots contribute organic matter to the soils and leave channels and pores that provide passageways for the intake of air and water. Deep rooting brush plants bring nutrients from the subsoil to the surface.

Earthworms, insects, and burrowing animals mix soil materials and create channels for the downward movement of air, water, and plant roots into the soil. Actinomycetes, bacteria, and fungi break down primary forms of organic matter, create humus, and release plant nutrients which improve soil tilth and fertility.

Humans have greatly affected the soils in Duval County. In the past, some rangeland has been overstocked with livestock and native wildlife. This resulted in overgrazing which caused the better grasses, brush, and forbs to decrease, and be replaced with less desirable grasses, brush, and forbs. Overgrazing by livestock and other animals increases the amount of bare ground and soil compaction, thereby increasing runoff and soil erosion.

Farming has resulted in excessive water and wind erosion in some areas. Crop residue management, terraces, grassed waterways, reduced tillage, and vegetated windstrips help control erosion on cropland. Soil compaction because of farm equipment has slowed the movement of air, moisture, and roots in the soil on much of the cropland in the survey area.

Relief

Relief or topography affects soil formation through its influence on drainage, erosion, and plant cover. The degree of development of a soil profile depends on the amount of water that enters the soil, provided other factors of soil formation are equal.

Soils such as Catarina that are nearly level absorb more rainfall, have greater profile development, less water erosion, and less runoff, generally, than soils such as Olmedo that are steep. Soils on steeper slopes may erode away nearly as fast as they form. On nearly level slopes, which are more stable, the rate of soil formation generally exceeds soil loss through erosion, and deeper soil profiles develop.

Time

The characteristics of a soil are determined mainly by the length of time that the soil forming factors have been active. Hundreds to thousands of years may be required for the formation of well-defined, genetic horizons. Genetically, the soils in Duval County range from very young to old. Differences in the ages of the soils can be noted in their profiles.

The Sinton soil is a young soil which developed on recent floodplains. This soil consists of altered alluvial sediments.

Old soils are generally nearly level to gently undulating, and are on stable, upland positions on the landscape that are actually ancient stream terraces. The Olmedo soil is an old soil in which calcium carbonate was leached from the upper part of the profile, and accumulated as a layer of cemented caliche.

Processes of Horizon Differentiation

Soils are derived from the decomposition of the mineral particles they contain and from the plant and animal remains added to them. Silicate clays, mineral particles, humus, living organisms, and water have a major influence in determining the character of the soil. Soil layers, or horizons, are formed by additions, removals, transfers, and transformations within the soil profile. (Soil Survey Staff, 1998) These processes include additions or losses of organic, mineral, and gaseous materials to the soil, transfers of material from one point to another within the soil, and physical and chemical transformation of mineral and organic materials within the soil. In most soils, more than one of these processes have been active in the development of horizons and many processes occur simultaneously.

Soil profiles are made up of a series of horizons that extend from the surface to the parent material. The parent material has been influenced little by the processes of soil formation. The horizons that make up a soil profile differ in one or more properties, such as color, texture, structure, consistence, porosity, and reaction.

Most profiles have four major horizons. These are the A, E, B, and C horizons. Some soils do not have E, B, or C horizons.

The A horizon is the surface layer. It is the horizon that has the maximum accumulation of organic matter. Organic matter has accumulated, partially decomposed, and been incorporated into the soil. The accumulation of organic matter in soils is greatest in and above the surface layer. Many of the more stable products of organic matter decomposition remain as finely divided materials that result in darker colors, increased water-holding and cation-exchange capacities, and granulation of the soil.

The content of organic matter in the soils in Duval County ranges from low to medium. Czar, Clareville, and Colmena soils have accumulated sufficient organic matter to form a dark surface layer, or A horizon. Nueces, Premont, and Delfina soils have a low organic matter light surface layer, or A horizon.

The E horizon is the subsurface layer. It is directly below the A horizon. It is characterized by the leaching of dissolved or suspended materials. Clay particles, organic matter, and oxides of free iron have been leached from the E horizon, leaving a concentration of light-colored sand and silt particles or other resistant materials. Nusil, Nueces, and Sarita soils have well developed E horizons.

The B horizon is the subsoil. It is directly below the A or E horizons. It is the horizon that has the maximum accumulation of dissolved or suspended materials, such as clay and iron. It may also be an altered horizon that has a distinctly different structure than that of the A horizon but shows little evidence of clay translocation or accumulation.

A B horizon that has a significant amount of clay accumulation is called a Bt horizon. Clay accumulates in horizons largely because of translocation from upper to lower horizons. As water moves downward, it can carry small amounts of clay in suspension. This clay accumulates at depths penetrated by water. It accumulates in fine pores in the

soil and as clay films on surfaces of peds. Over long periods of time, at least a few thousand years, such processes can result in distinct horizons. Clareville, Delfina, and Weesatche soils are examples of soils that have strongly developed Bt horizons. Salco and Pernitas soils have a less developed Bt horizon. Monwebb soils have clays with a high degree of shrink-swell, which destroys the clay films.

In Duval County, the Mirasol soil has a B horizon that is cemented by secondary silica (Bqm horizon). The source of the silica was the volcanic material deposited about 20 million years before present times. Over time the silica moved down through the soil profile and eventually cemented into the duripan found today.

A B horizon that has distinct structure or color development with little or no evidence of clay accumulation is called a Bw horizon. Plant roots and other organisms contribute to the rearrangement of soil materials into secondary aggregates. Organic residues and secretions of organisms serve as cementing agents that help stabilize structural aggregates. Soils that have appreciable amounts of clay develop structural aggregates because of drying and wetting and because of shrinking and swelling.

Some soils in Duval County have a high content of clay that has montmorillonite (smectite) as the dominant clay mineral. These soils shrink and develop wide, deep cracks when dry and swell and become very plastic and cohesive when wet. Because of overburden pressure, soil movement, and stress caused by wetting and drying, a platy and wedge-like structure can form in the Bss horizon. Individual structural aggregates have distinct cleavage planes and polished faces known as slickensides. When the soil is dry, soil material from the surface often falls into the wide, deep cracks or is washed into the cracks by rain. When the soil is wet, lateral pressure caused by the swelling can result in surface heaving, which eventually leads to the formation of gilgai microrelief that consists of microhighs and microlows. Monwebb and Catarina soils have Bss horizons that have slickensides. They have gilgai microrelief.

Another important process in soil formation is the loss of components from the soil. Water can leach many soluble components, such as calcium carbonate, to the lower horizons in the profile. A horizon that has a significant accumulation of calcium carbonate is designated by the addition of the symbol "k." Weesatche, Pernitas, Benavides, Gertrudis and Salco are examples of soils that have accumulations of calcium carbonate in the lower horizons.

The C horizon is relatively unchanged by soil-forming processes, although in some places it is modified by weathering. It is generally below the B horizon. Soils with a C horizon include Copita and Annarose.

Surface Geology

Duval County is located in the west Coastal Plain of Texas. (Jones, 1952) The Geologic Atlas of Texas, the Crystal City-Eagle Pass Sheet and Laredo Sheet show the geologic outcrops in Duval County. The age of geologic material in Duval County range from Quaternary (Holocene/Recent) age material to Tertiary (Eocene) material. The oldest (Jackson Group) material is found in the northwestern portion of the county. The youngest (Holocene age) sediments are found along intermittent streams throughout the county and sandy deposits of the sandsheet (in southern Duval County). (UT-BEG, Crystal City-Eagle Pass Sheet; UT-BEG, Laredo Sheet) Floodwaters from rivers may have deposited the sediments that make up each formation mostly in the form of natural levees and deltas. The shifting of river mouths and channels combined these levees and deltas. These deltaic deposits are interbedded in places with marine and lagoonal beds, which were covered by the shifting river mouths. (Sellards and others, 1932) Because of differences in time, material source, and variation in velocity of floodwaters, the type and size of sediments varies among the different geologic formations.

Quaternary

Holocene

Holocene (Recent) age deposits can be divided into two categories in Duval County: they are either windblown deposits or alluvium. (UT-BEG, Laredo Sheet)

Windblown Deposits

A majority of the windblown deposits are mapped as sandsheet deposits and there is only one area mapped as stabilized sand dune deposits in the county. (UT-BEG, Laredo Sheet) Representative soils found in the sandsheet prairie include Sarita fine sand, Nueces fine sand, and Delfina loamy fine sand. These soils are separated principally on the thickness of the sandy epipedon (surface horizon). These eolian sands were deposited by prevailing southeasterly winds, and they conceal older formations such as the Lissie and Goliad Formations in the southern part of the county. However, outliers of the Goliad Formation can be found in ”islands” and mapped with the Delmita-Randado map unit. Active sand dunes are currently not found in Duval County, but they are mapped just to the south in Brooks County. There is one area of windblown deposits mapped in northern Duval County. (UT-BEG, Crystal City-Eagle Pass Sheet) Nusil loamy fine sand is mapped on these eolian sediments.

Alluvium

Alluvial flood plain deposits skirt intermittent streams throughout Duval County. (UT-BEG, Laredo Sheet) There are no perennial streams in the county. Southeasterly flowing streams include Chiltipin Creek, San Diego Creek, Macho Creek, Los Olmos Creek, and others. Examples of creeks that flow northwesterly towards the Nueces River include Colmena Creek and Piscachar Creek. The variable nature of the alluvium is derived from the different source materials, but in general the alluvium is “loamy.” The youngest sediments located usually near a channel are mapped as Sinton sandy clay loam, and the older alluvium on more stable landforms are mapped in the Czar-Clareville map unit, Alet map unit, or Tela map unit.

Pleistocene

Pleistocene fluviatile terrace deposits are primarily mapped in the northwestern part of Duval County. They contain gravel, sand silt, and clay. (UT-BEG, Crystal City-Eagle Pass Sheet) Soils mapped on these sediments are affected to different degrees by sodium and gypsum. Soils mapped in this area include Brundage fine sandy loam and Monwebb clay.

The Lissie Formation in eastern Duval County is part of the area once known as the Alice Plain. (Duessen, 1930) It is generally about 250 feet thick, and it is gently rolling with some small depressions. Geologic units include meanderbelt, levee, crevasse, splay, and distributary sands and floodbasin mud over meanderbelt sand. (UT-BEG, Laredo Sheet) The deposits probably began during the Glacial Epoch and were laid down by violent flooding. (Sellards and others, 1932) Soils occupying paleoterrace landforms include Premont fine sandy loam, Colmena fine sandy loam, and to a lesser extent, Delfina fine sandy loam.

Tertiary

Pliocene

The Goliad Formation is the most extensive formation in Duval County, and averages a thickness of at least 250 feet. (UT-BEG, Laredo Sheet) It is often characterized by a “cap rock” of indurated calcium carbonate. Fossils are rarely found. Topographically it has eroded into

ridges and valleys. The stratigraphy and lithology of the Goliad Formation is variable. The formation is fluvial in origin and contains clays and sands, some cross-bedded, and conglomerates of siliceous gravels. This variability results in a variety of soils. Loamy soils such as Weesatche fine sandy loam, Weesatche sandy clay loam, Pernitas fine sandy loam, Pernitas sandy clay loam, and Benavides fine sandy loam are examples of series mapped over the Goliad Formation. These soils are believed to show evidence of reworking (during erosional periods) because their landforms are paleoterraces and their profiles are thicker than 80 inches; the petrocalcic does not appear in the soil profile.

Soils that have cemented calcium carbonate material (petrocalcic horizons) within 80 inches of the surface include Olmedo very gravelly sandy loam, and Piedras and Cuevitas soils. The cemented calcium carbonate (locally referred to as caliche) is a result of soil pedogenisis, and bears witness to the stability of the landscape when the soils were forming. Grava soils are also mapped over the Goliad Formation, but the petrocalcic horizon has up to 80 percent (water deposited) rounded siliceous gravels. The source of these gravels could possibly have been the ancestral Nueces River that cut through Duval County and fed into Baffin Bay. (Lindemann, 1963)

Miocene

In Duval County, the Oakville Sandstone and Fleming Formation are not mapped separately, and occupy a relatively narrow band with a thickness of around 500 feet. It lies between the Goliad and Catahoula Formations. They are of Miocene age. The formations are fluvial in origin and consist of a massive to cross-bedded, calcareous, and medium to coarse-grained sandstone with beds of silt and clay. (UT-BEG, Laredo Sheet) The Fleming Formation is similar to the Oakville Sandstone except that it contains more clay. Annarose fine sandy loam is an example of a soil formed above the Oakville Sandstone. Also, Weesatche fine sandy loam and Pernitas fine sandy loam soils are mapped on these formations and probably formed from deposits of loamy, levee material. In southern Duval County the Goliad Formation “oversteps the Oakville and rests unconformably on the Catahoula Formation. (Lindemann, 1963)

The Catahoula Formation is of early Miocene and Oligocene age, and has three members in Duval County. They are the Chusa Tuff Member, Soledad Volcanic Conglomerate Member, and the Fant Tuff Member. Their combined thickness is around 900 feet. Collectively they are composed of mudstones, claystones, sandstones, and clay. (UT-BEG, Laredo Sheet) The volcanic nature of the formation has led to the creation of a duripan horizon as seen in the subsoil of the Mirasol very gravelly sandy loam soil. The duripan is formed from the cementation of the soil matrix by silica that was supplied from the volcanic ash. Indurated sandstones (possible duripans) form “cuesta scarps” where the less indurated sandstones form “topographic highs”. (Lindemann, 1963) Other soils mapped over this geology include the Houla clay loam and Lomart loam. The combination of cuesta-forming faults and ridge-creating erosional events have made the western part of Duval County’s landscape the most undulating in the county.

The Frio Formation is found in a relatively narrow band just west of the Catahoula Formation in Duval County. Its average thickness is 200 feet, and consists of dark greenish-gray clay with some gypsum and calcareous concretions. (UT-BEG, Laredo Sheet) Examples of soils that formed from this clayey formation include Catarina clay and Maverick clay.

Eocene

The only Eocene age material in Duval County is the Jackson Group. This material is about 350 feet thick and is mainly sandstone with some clay. The sandstone is commonly laminated and crossbedded, gray, green, or light yellowish brown. The clay is greenish gray, pink, or red has abundant silicified wood. (UT-BEG, Laredo Sheet) The origin of these strata is a series of marine, brackish water, nearshore, and continental deposits. (Sellards and others, 1932) Representative soils mapped over this geology include Copita sandy clay loam, Aguilares fine sandy loam, and Maverick clay.

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the "National Soil Survey Handbook" (available in local offices of the Natural Resources Conservation Service or on the Internet).

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone. A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

Alluvial fan. A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction toward which a slope faces. Also called slope aspect.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp. A flood-plain landform. Extensive, marshy or swampy, depressed areas of floodplains between natural levees and valley sides or terraces.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology). A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding plane. A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology) from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle-size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. An informal term loosely applied to various portions of a flood plain.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Cement rock. Clayey limestone used in the manufacture of cement.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. See Redoximorphic features.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A dense, compact, slowly permeable subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand/or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at

the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are compounds making up concretions. See Redoximorphic features.

Conglomerate. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop resibecause of the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion (geomorphology). A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop resibecause of the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cutbanks cave (in tables)**.** The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables)**.** A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diatomaceous earth. A geologic deposit of fine, gray siliceous material composed chiefly or entirely of the remains of diatoms.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained*, and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Draw. A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

Earthy fill. See Mine spoil.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit. Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand/or loess.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as floodplains and coastal plains. Synonym: natural erosion.

Erosion surface. A land surface shaped by the action of erosion, especially by running water.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan remnant. A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms. A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain step. An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial. Of or pertaining to rivers or streams; produced by stream or river action.

Foothills. A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

Footslope. The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microlows (microbasins) and microhighs (microknolls) in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim (in tables)**.** Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides,

humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. A landform composed of the relatively undissected upland/or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology). A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland/or can merge, resulting in a strongly convex shape.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally

below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. See Redoximorphic features.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K-sat. Saturated hydraulic conductivity. (See Permeability.)

Landslide. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables)**.** Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at 1/3-or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength. The soil is not strong enough to support loads.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Mass movement. A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. See Redoximorphic features.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

Mine spoil. An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. A kind of map unit that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common*, and *many; size—fine, medium*, and *coarse*; and *contrast—faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch)*; medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch)*;* and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. See Redoximorphic features.

Nose slope (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedon. The smallest volume that can be called "a soil." A pedon is three-dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 000.0015 inch
Very slow	000.0015 to 00.06 inch
Slow	00.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables)**.** Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables)**.** Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology). A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings. See Redoximorphic features.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Precipitation Effectiveness Index (PE Index) is the measure of the long-range effectiveness of precipitation in promoting plant growth for a given location. The formula for calculating PE Index is:

$$\text{P-E Index} = 10 \sum_{n-1}^{12} (\text{P-E index})_n$$

The formula is equal to 10 times the sum of the monthly precipitation-evaporation ratios (monthly precipitation amounts divided by monthly evaporation amounts).

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   a. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; and
   b. Masses, which are noncemented concentrations of substances within the soil matrix; and
   c. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   a. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; and
   b. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.

Regolith. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Saturated hydraulic conductivity (K-sat). See Permeability.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell (in tables)**.** The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface

of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides (pedogenic). Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 1 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Slope alluvium. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill (in tables)**.** The slow filling of ponds, resulting from restricted permeability in the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na+ to Ca ++ + Mg++. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel-or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless soils are either single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. See Underlying material.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace (conservation). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology). A steplike surface, bordering a valley floor or shoreline that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables)**.** Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Underlying material. The part of the soil below the solum.

Valley fill. The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by

atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Freer, Texas)

Month	Temperature (Degrees F)						Precipitation (Inches)			
				2 years in 10 will have		Average number of growing degree days*		2 years in 10 will have		Average number of days w/0.1 or more
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than	Minimum temperature less than		Average	less than	more than	
January---	67.4	42.4	54.9	88	22	175	1.13	0.18	2.09	2
February--	70.3	45.8	58.0	93	23	228	1.28	0.33	2.08	3
March-----	78.9	53.0	66.0	95	31	465	1.56	0.09	2.37	2
April-----	85.1	59.3	72.2	100	39	648	1.77	0.35	2.99	2
May-------	88.8	66.8	77.8	102	52	826	3.62	1.12	6.31	3
June------	93.2	71.1	82.2	103	59	930	3.72	0.73	6.81	4
July------	95.5	72.4	84.0	104	65	1,025	1.60	0.23	2.49	2
August----	96.1	72.5	84.3	103	65	1,002	2.86	0.46	4.88	3
September-	90.7	68.8	79.8	100	50	877	3.21	0.75	5.09	3
October---	84.6	61.2	72.9	96	41	669	3.14	1.03	5.17	3
November--	76.5	50.7	63.6	91	27	385	1.60	0.00	3.06	2
December--	68.6	45.1	56.8	89	24	217	1.09	0.19	1.67	2
Yearly:										
Average	83.0	59.1	71.2	---	---	---	---	---	---	---
Extreme	108	18	---	106	20	---	---	---	---	---
Total	---	---	---	---	---	7,447	26.57	16.53	32.84	31

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold: 50.0 degrees F)

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Freer, Texas)

Probability	Temperature		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	January 30	February 17	March 15
2 years in 10 later than--	January 17	February 3	March 6
5 years in 10 later than--	---------	December 21	February 18
First freezing temperature in fall:			
1 year in 10 earlier than--	December 9	November 28	November 14
2 years in 10 earlier than--	December 22	December 7	November 22
5 years in 10 earlier than--	---------	January 6	December 7

Table 3.--Growing Season

(Recorded for the period 1971-2000 at Freer, Texas)

Probability	Daily Minimum Temperature		
	Number of days higher than 24°F	Number of days higher than 28°F	Number of days higher than 32°F
	Days	Days	Days
9 years in 10	325	303	255
8 years in 10	345	322	270
5 years in 10	> 365	> 365	298
2 years in 10	> 365	> 365	326
1 year in 10	> 365	> 365	341

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AgC	Aguilares fine sandy loam, 1 to 5 percent slopes	25,710	2.2
AlA	Alet sandy clay loam, 0 to 1 percent slopes, rarely flooded	63,202	5.5
AnC	Annarose fine sandy loam, 2 to 5 percent slopes	2,449	0.2
BdC	Benavides fine sandy loam, 2 to 5 percent slopes	140,089	12.2
BnC	Brennan loamy fine sand, 1 to 5 percent slopes	336	*
BrB	Brennan fine sandy loam, 0 to 3 percent slopes	561	*
BuA	Brundage fine sandy loam, 0 to 2 percent slopes, rarely flooded	1,032	*
CaA	Catarina clay, 0 to 1 percent slopes	5,225	0.5
CmB	Colmena fine sandy loam, 0 to 3 percent slopes	28,531	2.5
CoC	Comitas loamy fine sand, 0 to 5 percent slopes	4,205	0.4
CpC	Copita sandy clay loam, 1 to 5 percent slopes	7,178	0.6
CyB	Coy clay loam, 1 to 3 percent slopes	2,324	0.2
CZA	Czar-Clareville soils, 0 to 1 percent slopes, rarely flooded	32,682	2.8
DaB	Delfina loamy fine sand, 0 to 3 percent slopes	18,265	1.6
DeA	Delfina fine sandy loam, 0 to 2 percent slopes	57,890	5.0
DfB	Delmita loamy fine sand, 0 to 3 percent slopes	26,762	2.3
DmB	Delmita fine sandy loam, 0 to 3 percent slopes	27,341	2.4
DRB	Delmita-Randado complex, 0 to 3 percent slopes	104,418	9.1
GeB	Gertrudis fine sandy loam, 0 to 3 percent slopes	11,637	1.0
GRD	Grava soils, 1 to 8 percent slopes	25,833	2.2
HeB	Hebbronville fine sandy loam, 1 to 3 percent slopes	966	*
HoB	Houla clay loam, 0 to 3 percent slopes	53,010	4.6
JdB	Jardin fine sandy loam, 1 to 3 percent slopes	3,421	0.3
LoC	Lomart loam, 1 to 5 percent slopes	25,211	2.2
McB	Maverick clay, 1 to 3 percent slopes	2,706	0.2
MgD	Mirasol very gravelly sandy loam, 1 to 8 percent slopes	16,412	1.4
MoC	Moglia clay loam, 1 to 5 percent slopes	11,158	1.0
MwA	Monwebb clay, 0 to 1 percent slopes, occasionally flooded	5,450	0.5
NfC	Nueces fine sand, 0 to 5 percent slopes	22,316	1.9
NuC	Nusil loamy fine sand, 1 to 5 percent slopes	315	*
OmD	Olmedo very gravelly sandy loam, 1 to 8 percent slopes	67,660	5.9
PgA	Papagua fine sandy loam, 0 to 1 percent slopes	429	*
PmC	Pernitas fine sandy loam, 1 to 5 percent slopes	31,934	2.8
PnB	Pernitas sandy clay loam, 1 to 3 percent slopes	11,831	1.0
PRC	Piedras and Cuevitas soils, 1 to 5 percent slopes	147,976	12.9
Ps	Pits, quarry	1,745	0.2
PtB	Premont fine sandy loam, 0 to 3 percent slopes	21,857	1.9
ReA	Realitos clay, 0 to 1 percent slopes	3,507	0.3
SaC	Salco sandy clay loam, 1 to 5 percent slopes	24,840	2.2
SnC	Sarita fine sand, 0 to 5 percent slopes	1,448	0.1
StA	Sinton sandy clay loam, 0 to 1 percent slopes, occasionally flooded	14,448	1.3
TaA	Tela sandy clay loam, 0 to 1 percent slopes, rarely flooded	25,021	2.2
TcA	Tiocano clay, 0 to 1 percent slopes, ponded	1,040	*
WaB	Weesatche fine sandy loam, 1 to 3 percent slopes	61,154	5.3
WaC	Weesatche fine sandy loam, 3 to 5 percent slopes	1,419	0.1
WeB	Weesatche sandy clay loam, 1 to 3 percent slopes	5,901	0.5
	Total	1,148,845	100.0

* Less than 0.1 percent.

Table 5.--Prime and Other Important Farmland

(Only the soils considered prime or important farmland are listed. Urban or built-up areas of the soils listed are not considered prime or important farmland. If a soil is prime or important farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map Symbol	Map unit name	Farmland Classification
AlA	Alet sandy clay loam, 0 to 1 percent slopes, rarely flooded	Prime farmland if irrigated
BrB	Brennan fine sandy loam, 0 to 3 percent slopes	Prime farmland if irrigated
CmB	Colmena fine sandy loam, 0 to 3 percent slopes	Prime farmland if irrigated
CyB	Coy clay loam, 1 to 3 percent slopes	Prime farmland if irrigated
CZA	Czar-Clareville soils, 0 to 1 percent slopes, rarely flooded	Prime farmland if irrigated
DeA	Delfina fine sandy loam, 0 to 2 percent slopes	Prime farmland if irrigated
GeB	Gertrudis fine sandy loam, 0 to 3 percent slopes	Prime farmland if irrigated
PnB	Pernitas sandy clay loam, 1 to 3 percent slopes	Prime farmland if irrigated
PtB	Premont fine sandy loam, 0 to 3 percent slopes	Prime farmland if irrigated
StA	Sinton sandy clay loam, 0 to 1 percent slopes, occasionally Flooded	Prime farmland if irrigated
TaA	Tela sandy clay loam, 0 to 1 percent slopes, rarely flooded	Prime farmland if irrigated

Table 6.--Land Capability and Nonirrigated Yields by Map Unit

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability	Buffelgrass	Grain sorghum	Improved bermudagrass	Kleingrass	Oats
		AUM	Bu	AUM	AUM	Bu
AgC:		---	---	---	---	---
Aguilares	4e					
AlA:		---	---	---	---	---
Alet	2e					
AnC:		---	---	---	---	---
Annarose	3e					
BdC:		---	---	---	---	---
Benavides	3e					
BnC:		---	---	---	---	---
Brennan	3e					
BrB:		---	40.00	3.00	---	---
Brennan	3c					
BuA:		---	---	---	---	---
Brundage	6s					
CaA:		---	---	---	---	---
Catarina	6s					
CmB:		---	50.00	---	---	---
Colmena	2e					
CoC:		---	35.00	3.00	---	---
Comitas	4e					
CpC:		---	---	---	---	---
Copita	6e					
CyB:		---	---	---	---	---
Coy	2e					
CZA:		---	---	---	---	---
Czar	2c					
Clareville	2c					
DaB:		---	28.00	2.00	---	---
Delfina	**3e**					
DeA:		---	35.00	4.00	4.00	---
Delfina	2e					
DfB:		---	25.00	3.00	2.00	---
Delmita	4e					
DmB:		---	30.00	3.00	2.00	---
Delmita	3e					
DRB:		---	30.00	3.00	2.00	---
Delmita	3e					
Randado	6s					

Table 6.--Land Capability and Nonirrigated Yields by Map Unit--Continued

Map symbol and soil name	Land capability	Buffelgrass	Grain sorghum	Improved bermudagrass	Kleingrass	Oats
		AUM	Bu	AUM	AUM	Bu
GeB:		---	45.00	---	---	---
Gertrudis	2e					
GRD:		---	---	---	---	---
Grava	7s					
HeB:		---	---	---	---	---
Hebbronville	3e					
HoB:		---	---	---	---	---
Houla	3s					
JdB:		---	---	---	---	---
Jardin	6s					
LoC:		---	---	---	---	---
Lomart	6e					
McB:		---	35.00	2.50	---	---
Maverick	2e					
MgD:		1.50	---	2.00	2.00	---
Mirasol	7s					
MoC:		---	---	---	---	---
Moglia	6e					
MwA:		---	---	---	---	35.00
Monwebb	4s					
NfC:		---	---	3.00	---	---
Nueces	4e					
NuC:		---	---	---	---	---
Nusil	4e					
OmD:		---	---	---	---	---
Olmedo	7s					
PgA:		3.00	45.00	3.00	---	---
Papagua	3w					
PmC:		---	35.00	2.50	2.50	---
Pernitas	2e					
PnB:		---	35.00	2.50	2.50	---
Pernitas	2e					
PRC:		---	---	---	---	---
Piedras	6s					
Cuevitas	7s					
Ps:		---	---	---	---	---
Pits, quarry	---					
PtB:		---	35.00	4.00	4.00	---
Premont	3e					

Table 6.--Land Capability and Nonirrigated Yields by Map Unit--Continued

Map symbol and soil name	Land capability	Buffelgrass	Grain sorghum	Improved bermudagrass	Kleingrass	Oats
		AUM	Bu	AUM	AUM	Bu
ReA:		---	---	---	---	---
Realitos	4w					
SaC:		3.00	---	3.00	3.00	---
Salco	3s					
SnC:		---	---	3.00	---	---
Sarita	6e					
StA:		---	70.00	6.00	---	---
Sinton	2w					
TaA:		6.00	---	6.00	---	---
Tela	3c					
TcA:		---	---	4.00	---	---
Tiocano	6w					
WaB:		---	50.00	5.50	---	---
Weesatche	3e					
WaC:		---	50.00	5.50	---	---
Weesatche	3e					
WeB:		---	50.00	5.50	---	---
Weesatche	3e					

Table 7.--Rangeland Productivity

(Only the soils that support rangeland vegetation suitable for grazing are rated.)

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
AgC:				
Aguilares	Gray Loamy Upland 18-25" PZ	3,600	3,000	1,600
AlA:				
Alet	Loamy Bottomland 20-35" PZ	4,000	3,000	2,000
AnC:				
Annarose	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
BdC:				
Benavides	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
BnC:				
Brennan	Sandy Loam 25-35" PZ	4,200	3,500	2,000
BrB:				
Brennan	Sandy Loam 25-35" PZ	4,400	3,600	2,200
BuA:				
Brundage	Claypan Prairie 18-25" PZ	3,000	2,500	1,500
CaA:				
Catarina	Saline Clay 18-25" PZ	3,000	2,300	1,500
CmB:				
Colmena	Sandy Loam 20-25" PZ	4,400	3,600	2,200
CoC:				
Comitas	Loamy Sand 25-35" PZ	4,000	3,000	1,800
CpC:				
Copita	Gray Sandy Loam 18-25" PZ	3,600	2,800	1,400
CyB:				
Coy	Clay Loam 20-25" PZ	4,000	3,500	2,500
CZA:				
Czar	Loamy Bottomland 20-35" PZ	5,800	5,000	3,000
Clareville	Clay Loam 25-35" PZ	5,800	5,000	3,000
DaB:				
Delfina	Loamy Sand 25-35" PZ	4,500	3,800	2,000
DeA:				
Delfina	Sandy Loam 25-35" PZ	3,500	3,000	1,000
DfB:				
Delmita	Loamy Sand 25-35" PZ	3,500	2,700	1,200
DmB:				
Delmita	Red Sandy Loam 20-25" PZ	4,000	3,000	1,500
DRB:				
Delmita	Red Sandy Loam 20-25" PZ	4,000	3,000	1,500
Randado	Shallow Sandy Loam 20-30" PZ	3,500	2,300	1,000

Table 7.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
GeB:				
Gertrudis	Gray Sandy Loam 20-25" PZ	4,500	3,500	2,500
GRD:				
Grava	Gravelly Ridge 20-35" PZ	3,000	1,800	1,000
HeB:				
Hebbronville	Sandy Loam 25-35" PZ	4,400	3,500	2,000
HoB:				
Houla	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
JdB:				
Jardin	Shallow Sandy Loam 20-30" PZ	3,000	1,800	1,000
LoC:				
Lomart	Shallow Sandy Loam 20-30" PZ	2,700	1,800	1,000
McB:				
Maverick	Rolling Hardland 18-25" PZ	3,500	3,000	2,000
MgD:				
Mirasol	Shallow Ridge 20-25" PZ	3,500	2,300	1,000
MoC:				
Moglia	Saline Clay Loam 18-35" PZ	3,600	2,700	1,500
MwA:				
Monwebb	Clay Flat 18-25" PZ	4,000	3,000	1,500
NfC:				
Nueces	Sandy 20-35" PZ	5,000	3,500	2,000
NuC:				
Nusil	Sandy 20-35" PZ	5,000	4,000	2,500
OmD:				
Olmedo	Shallow Ridge 20-25" PZ	2,700	1,800	1,000
PgA:				
Papagua	Lakebed 20-35" PZ	6,000	4,500	2,500
PmC:				
Pernitas	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
PnB:				
Pernitas	Gray Sandy Loam 20-25" PZ	4,000	3,000	2,000
PRC:				
Piedras	Shallow Sandy Loam 20-25" PZ	3,500	2,300	1,000
Cuevitas	Shallow Sandy Loam 20-25" PZ	3,500	2,300	1,000
Ps:				
Pits, quarry	---	---	---	---
PtB:				
Premont	Sandy Loam 25-35" PZ	3,500	3,000	1,000

Table 7.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
ReA:				
Realitos	Lakebed 20-35" PZ	4,400	3,300	2,200
SaC:				
Salco	Gray Loamy Upland 20-25" PZ	3,400	2,500	1,000
SnC:				
Sarita	Sandy 20-35" PZ	5,000	4,000	2,000
StA:				
Sinton	Loamy Bottomland 20-35" PZ	7,000	6,000	4,000
TaA:				
Tela	Ramadero 20-25" PZ	6,000	4,500	2,500
TcA:				
Tiocano	Lakebed 20-35" PZ	4,400	3,300	2,200
WaB:				
Weesatche	Sandy Loam 25-35" PZ	4,000	3,000	2,000
WaC:				
Weesatche	Sandy Loam 25-35" PZ	4,000	3,000	2,000
WeB:				
Weesatche	Clay Loam 25-35" PZ	4,000	3,000	2,000

Table 8.--Ranch Access Roads

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct of map unit	Ranch Access Roads: Rating class and limiting features	Ranch Access Roads: Value
AgC:			
Aguilares	90	Not limited	
AlA:			
Alet	85	Not limited	
AnC:			
Annarose	80	Not limited	
BdC:			
Benavides	90	Not limited	
BnC:			
Brennan	90	Somewhat limited	
		Sandy surface	0.50
BrB:			
Brennan	90	Not limited	
BuA:			
Brundage	90	Not limited	
CaA:			
Catarina	90	Somewhat limited	
		Too clayey	0.25
CmB:			
Colmena	85	Not limited	
CoC:			
Comitas	90	Somewhat limited	
		Sandy surface	0.50
CpC:			
Copita	90	Not limited	
CyB:			
Coy	90	Not limited	
CZA:			
Czar	60	Not limited	
Clareville	35	Not limited	
DaB:			
Delfina	90	Somewhat limited	
		Sandy surface	0.50
DeA:			
Delfina	95	Not limited	

Table 8.--Ranch Access Roads--Continued

Map symbol and soil name	Pct of map unit	Ranch Access Roads: Rating class and limiting features	Value
DfB:			
Delmita	90	Somewhat limited	
		Sandy surface	0.50
DmB:			
Delmita	90	Not limited	
DRB:			
Delmita	60	Not limited	
Randado	35	Not limited	
GeB:			
Gertrudis	90	Not limited	
GRD:			
Grava	85	Not limited	
HeB:			
Hebbronville	90	Not limited	
HoB:			
Houla	90	Not limited	
JdB:			
Jardin	90	Very limited	
		Large stones	1.00
LoC:			
Lomart	85	Somewhat limited	
		Dusty	0.50
McB:			
Maverick	80	Somewhat limited	
		Too clayey	0.25
MgD:			
Mirasol	85	Not limited	
MoC:			
Moglia	85	Not limited	
MwA:			
Monwebb	90	Somewhat limited	
		Too clayey	0.25
NfC:			
Nueces	80	Somewhat limited	
		Sandy surface	0.50
NuC:			
Nusil	90	Somewhat limited	
		Sandy surface	0.50
OmD:			
Olmedo	90	Very limited	
		Large stones	1.00

Table 8.--Ranch Access Roads--Continued

Map symbol and soil name	Pct of map unit	Ranch Access Roads: Rating class and limiting features	Value
PgA:			
Papagua	90	Very limited	
		Depth to saturated zone	1.00
		Ponding	1.00
PmC:			
Pernitas	90	Not limited	
PnB:			
Pernitas	85	Not limited	
PRC:			
Piedras	60	Very limited	
		Large stones	1.00
Cuevitas	35	Not limited	
Ps:			
Pits, quarry	100	Not rated	
PtB:			
Premont	90	Not limited	
ReA:			
Realitos	90	Very limited	
		Ponding	1.00
		Too clayey	0.25
SaC:			
Salco	90	Not limited	
SnC:			
Sarita	90	Somewhat limited	
		Sandy surface	0.50
StA:			
Sinton	90	Not limited	
TaA:			
Tela	90	Not limited	
TcA:			
Tiocano	90	Very limited	
		Depth to saturated zone	1.00
		Ponding	1.00
		Too clayey	0.25
WaB:			
Weesatche	87	Not limited	
WaC:			
Weesatche	87	Not limited	
WeB:			
Weesatche	85	Not limited	

Table 9.--Plastic Water Pipeline Installation, Fencing, Post Depth Less Than 24 Inches, Less Than 36 Inches

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Plastic Water Pipeline Installation		Fencing, Post Depth Less Then 24 inches		Fencing, Post Depth Less Then 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgC:							
Aguilares	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.61	Too clayey	0.61	Too clayey	0.61
		High shrink-swell	0.39	High shrink-swell	0.59	High shrink-swell	0.60
		Unstable excavation walls	0.10	Excess salt	0.50	Excess salt	0.50
AlA:							
Alet	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.84	Too clayey	0.84	Too clayey	0.84
		Occasional flooding	0.40	Occasional flooding	0.40	Occasional flooding	0.40
		Unstable excavation walls	0.10	High shrink-swell	0.01	High shrink-swell	0.01
		High shrink-swell	0.01				
AnC:							
Annarose	80	Very limited		Somewhat limited		Somewhat limited	
		Unstable excavation walls	1.00	Too clayey	0.32	Too clayey	0.32
		Too clayey	0.32	High shrink-swell	0.01	High shrink-swell	0.01
		High shrink-swell	0.01				
BdC:							
Benavides	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.92	Too clayey	0.92	Too clayey	0.92
		Unstable excavation walls	0.10	High shrink-swell	0.02	High shrink-swell	0.02
		High shrink-swell	0.02				
BnC:							
Brennan	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.61	Too clayey	0.61	Too clayey	0.61
		Unstable excavation walls	0.10	High shrink-swell	0.01	High shrink-swell	0.01
		High shrink-swell	0.01				
BrB:							
Brennan	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.68	Too clayey	0.68	Too clayey	0.68
		Unstable excavation walls	0.10	High shrink-swell	0.01	High shrink-swell	0.01
		High shrink-swell	0.01				
BuA:							
Brundage	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.86	Too clayey	0.86	Too clayey	0.86
		Occasional flooding	0.40	Excess salt	0.50	High shrink-swell	0.53
		High shrink-swell	0.39	High shrink-swell	0.49	Excess salt	0.50
		Unstable excavation walls	0.10	Occasional flooding	0.40	Occasional flooding	0.40

Table 9.--Plastic Water Pipeline Installation, Fencing, Post Depth Less Than 24 Inches, Less Than 36 Inches--Continued

Map symbol and soil name	Pct. of map unit	Plastic Water Pipeline Installation: Rating class and limiting features	Value	Fencing, Post Depth Less Then 24 inches: Rating class and limiting features	Value	Fencing, Post Depth Less Then 36 inches: Rating class and limiting features	Value
CaA:							
Catarina	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		High shrink-swell	0.50	Excess salt	0.50	Excess salt	0.50
CmB:							
Colmena	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.68	Too clayey	0.68	Too clayey	0.74
		High shrink-swell	0.39	High shrink-swell	0.43	High shrink-swell	0.49
		Unstable excavation walls	0.10				
CoC:							
Comitas	90	Very limited		Somewhat limited		Somewhat limited	
		Unstable excavation walls	1.00	High shrink-swell	0.01	Too acid	0.43
		High shrink-swell	0.01			High shrink-swell	0.01
CpC:							
Copita	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.74	Too clayey	0.74	Too clayey	0.74
		Unstable excavation walls	0.10			Depth to paralithic bedrock	0.68
CyB:							
Coy	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.50	High shrink-swell	1.00	High shrink-swell	1.00
		Unstable excavation walls	0.10				
CZA:							
Czar	60	Somewhat limited		Very limited		Somewhat limited	
		Too clayey	0.92	High shrink-swell	1.00	High shrink-swell	0.98
		High shrink-swell	0.48	Too clayey	0.92	Too clayey	0.92
		Occasional flooding	0.40	Occasional flooding	0.40	Occasional flooding	0.40
		Unstable excavation walls	0.10				
Clareville	35	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.50	High shrink-swell	0.92	High shrink-swell	0.98
		Occasional flooding	0.40	Occasional flooding	0.40	Occasional flooding	0.40
		Unstable excavation walls	0.10				
DaB:							
Delfina	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.92	Too clayey	0.92	Too clayey	0.92
		High shrink-swell	0.39	High shrink-swell	0.34	High shrink-swell	0.41
		Unstable excavation walls	0.10				

Table 9.--Plastic Water Pipeline Installation, Fencing, Post Depth Less Than 24 Inches, Less Than 36 Inches--Continued

Map symbol and soil name	Pct. of map unit	Plastic Water Pipeline Installation: Rating class and limiting features	Value	Fencing, Post Depth Less Then 24 inches: Rating class and limiting features	Value	Fencing, Post Depth Less Then 36 inches: Rating class and limiting features	Value
DeA:							
Delfina	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.92	Too clayey	0.92	Too clayey	0.92
		High shrink-swell	0.39	High shrink-swell	0.17	High shrink-swell	0.26
		Unstable excavation walls	0.10				
DfB:							
Delmita	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.39	Too clayey	0.39	Too clayey	0.39
		Unstable excavation walls	0.10				
DmB:							
Delmita	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.61	Too clayey	0.61	Too clayey	0.61
		Unstable excavation walls	0.10				
DRB:							
Delmita	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.61	Too clayey	0.61	Too clayey	0.61
		Unstable excavation walls	0.10				
Randado	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.26	Too clayey	0.26	Too clayey	0.26
		Unstable excavation walls	0.10				
GeB:							
Gertrudis	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.80	Too clayey	0.80	Too clayey	0.80
		High shrink-swell	0.39	High shrink-swell	0.16	High shrink-swell	0.25
		Unstable excavation walls	0.10				
GRD:							
Grava	85	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	Too gravelly	1.00	Too gravelly	1.00
HeB:							
Hebbronville	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.16	Too clayey	0.16	Too clayey	0.16
		Unstable excavation walls	0.10	High shrink-swell	0.01	High shrink-swell	0.01
		High shrink-swell	0.01				
HoB:							
Houla	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	0.10	High shrink-swell	0.54	High shrink-swell	0.31
		High shrink-swell	0.04				

Table 9.--Plastic Water Pipeline Installation, Fencing, Post Depth Less Than 24 Inches, Less Than 36 Inches--Continued

Map symbol and soil name	Pct. of map unit	Plastic Water Pipeline Installation: Rating class and limiting features	Value	Fencing, Post Depth Less Then 24 inches: Rating class and limiting features	Value	Fencing, Post Depth Less Then 36 inches: Rating class and limiting features	Value
JdB:							
Jardin	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.20	Too gravelly	0.74	Too gravelly	0.74
		Unstable excavation walls	0.10	Too clayey	0.20	Too clayey	0.20
LoC:							
Lomart	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.12	Too clayey	0.12	Depth to paralithic bedrock	0.16
		Unstable excavation walls	0.10			Too clayey	0.12
McB:							
Maverick	80	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.19	High shrink-swell	1.00	High shrink-swell	1.00
		Unstable excavation walls	0.10	Excess salt	0.50	Excess salt	0.50
						Depth to densic bedrock	0.09
MgD:							
Mirasol	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.26	Too gravelly	0.74	Too gravelly	0.74
		Unstable excavation walls	0.10	Too clayey	0.26	Too clayey	0.26
MoC:							
Moglia	85	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		High shrink-swell	0.46	High shrink-swell	0.59	High shrink-swell	0.60
		Unstable excavation walls	0.10				
MwA:							
Monwebb	90	Very limited		Very limited		Very Limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Unstable excavation walls	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		Occasional flooding	0.60	Occasional flooding	0.60	Occasional flooding	0.60
		High shrink-swell	0.50				
NfC:							
Nueces	80	Very limited		Somewhat limited		Somewhat limited	
		Unstable excavation walls	1.00	Too Sandy	0.50	Too clayey	0.92
		High shrink-swell	0.01	Too acid	0.43	Too Sandy	0.50
				High shrink-swell	0.01	Too acid	0.43
						High shrink-swell	0.01

Table 9.--Plastic Water Pipeline Installation, Fencing, Post Depth Less Than 24 Inches, Less Than 36 Inches--Continued

Map symbol and soil name	Pct. of map unit	Plastic Water Pipeline Installation: Rating class and limiting features	Value	Fencing, Post Depth Less Then 24 inches: Rating class and limiting features	Value	Fencing, Post Depth Less Then 36 inches: Rating class and limiting features	Value
NuC:							
Nusil	90	Very limited		Somewhat limited		Somewhat limited	
		Unstable excavation walls	1.00	High shrink-swell	0.02	Too clayey	0.77
		High shrink-swell	0.31			High shrink-swell	0.10
OmD:							
Olmedo	90	Very limited		Very limited		Very Limited	
		Unstable excavation walls	1.00	Too gravelly	1.00	Too gravelly	1.00
		Too clayey	0.24	Too clayey	0.24	Too clayey	0.24
PgA:							
Papagua	90	Very limited		Very limited		Very Limited	
		Ponding	1.00	Too clayey	1.00	Too clayey	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		High shrink-swell	0.50	High shrink-swell	0.82	High shrink-swell	0.93
		Unstable excavation walls	0.10				
PmC:							
Pernitas	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.92	Too clayey	0.92	Too clayey	0.92
		High shrink-swell	0.39	High shrink-swell	0.43	High shrink-swell	0.49
		Unstable excavation walls	0.10				
PnB:							
Pernitas	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.98	Too clayey	0.98	Too clayey	0.98
		High shrink-swell	0.39	High shrink-swell	0.26	High shrink-swell	0.34
		Unstable excavation walls	0.10				
PRC:							
Piedras	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Unstable excavation walls	0.10	Too clayey	0.02	Too clayey	0.02
		Too clayey	0.02				
Cuevitas	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.20	Too clayey	0.20	Too clayey	0.20
		Unstable excavation walls	0.10				
Ps:							
Pits, quarry	100	Not rated		Not rated		Not rated	
PtB:							
Premont	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.92	Too clayey	0.92	Too clayey	0.92
		High shrink-swell	0.39	High shrink-swell	0.35	High shrink-swell	0.42
		Unstable excavation walls	0.10				

Table 9.--Plastic Water Pipeline Installation, Fencing, Post Depth Less Than 24 Inches, Less Than 36 Inches--Continued

Map symbol and soil name	Pct. of map unit	Plastic Water Pipeline Installation: Rating class and limiting features	Value	Fencing, Post Depth Less Then 24 inches: Rating class and limiting features	Value	Fencing, Post Depth Less Then 36 inches: Rating class and limiting features	Value
ReA:							
Realitos	90	Very limited		Very limited		Very Limited	
		Ponding	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		Unstable excavation walls	1.00				
		High shrink-swell	0.50				
SaC:							
Salco	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.92	Too clayey	0.92	Too clayey	0.92
		High shrink-swell	0.39	High shrink-swell	0.59	High shrink-swell	0.60
		Unstable excavation walls	0.10				
SnC:							
Sarita	90	Very limited		Somewhat limited		Somewhat limited	
		Unstable excavation walls	1.00	Too Sandy	0.50	Too Sandy	0.50
		High shrink-swell	0.10	High shrink-swell	0.01	High shrink-swell	0.01
StA:							
Sinton	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.82	Too clayey	0.82	Too clayey	0.82
		Occasional flooding	0.60	Occasional flooding	0.60	Occasional flooding	0.60
		Unstable excavation walls	0.10	High shrink-swell	0.01	High shrink-swell	0.01
		High shrink-swell	0.01				
TaA:							
Tela	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.77	Too clayey	0.77	Too clayey	0.77
		Occasional flooding	0.40	Occasional flooding	0.40	Occasional flooding	0.40
		Unstable excavation walls	0.10	High shrink-swell	0.01	High shrink-swell	0.01
		High shrink-swell	0.01				
TcA:							
Tiocano	90	Very limited		Very limited		Very Limited	
		Ponding	1.00	Too clayey	1.00	Too clayey	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	1.00	High shrink-swell	1.00	High shrink-swell	1.00
		Unstable excavation walls	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		High shrink-swell	0.50				
WaB:							
Weesatche	87	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.82	Too clayey	0.82	Too clayey	0.82
		High shrink-swell	0.39	High shrink-swell	0.38	High shrink-swell	0.44
		Unstable excavation walls	0.10				

Table 9.--Plastic Water Pipeline Installation, Fencing, Post Depth Less Than 24 Inches, Less Than 36 Inches--Continued

Map symbol and soil name	Pct. of map unit	Plastic Water Pipeline Installation		Fencing, Post Depth Less Then 24 inches		Fencing, Post Depth Less Then 36 inches	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WaC:							
Weesatche-----------	87	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.82	Too clayey	0.82	Too clayey	0.82
		High shrink-swell	0.39	High shrink-swell	0.41	High shrink-swell	0.47
		Unstable excavation walls	0.10				
WeB:							
Weesatche-----------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.92	Too clayey	0.92	Too clayey	0.92
		High shrink-swell	0.39	High shrink-swell	0.36	High shrink-swell	0.42
		Unstable excavation walls	0.10				

Table 10.--Rangeland Roller Chopping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Rangeland Roller Chopping: Rating class and limiting features	Value
AgC:			
Aguilares	90	Somewhat limited	
		Droughty	0.01
AlA:			
Alet	85	Somewhat limited	
		Droughty	0.25
AnC:			
Annarose	80	Somewhat limited	
		Droughty	0.08
BdC:			
Benavides	90	Somewhat limited	
		Droughty	0.25
BnC:			
Brennan	90	Somewhat limited	
		Droughty	0.97
BrB:			
Brennan	90	Somewhat limited	
		Droughty	0.25
BuA:			
Brundage	90	Somewhat limited	
		Droughty	0.61
CaA:			
Catarina	90	Somewhat limited	
		Droughty	0.50
CmB:			
Colmena	85	Somewhat limited	
		Droughty	0.04
CoC:			
Comitas	90	Very limited	
		Droughty	1.00
CpC:			
Copita	90	Somewhat limited	
		Droughty	0.25
CyB:			
Coy	90	Not limited	
CZA:			
Czar	60	Not limited	
Clareville	35	Not limited	

Table 10.--Rangeland Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Roller Chopping: Rating class and limiting features	Value
DaB:			
Delfina	90	Somewhat limited	
		Droughty	0.25
DeA:			
Delfina	95	Somewhat limited	
		Droughty	0.25
DfB:			
Delmita	90	Somewhat limited	
		Droughty	0.99
DmB:			
Delmita	90	Somewhat limited	
		Droughty	0.50
DRB:			
Delmita	60	Somewhat limited	
		Droughty	0.50
Randado	35	Somewhat limited	
		Droughty	0.50
GeB:			
Gertrudis	90	Somewhat limited	
		Droughty	0.25
GRD:			
Grava	85	Somewhat limited	
		Droughty	0.68
HeB:			
Hebbronville	90	Somewhat limited	
		Droughty	0.84
HoB:			
Houla	90	Not limited	
JdB:			
Jardin	90	Very limited	
		Droughty	1.00
		Large stones	1.00
LoC:			
Lomart	85	Not limited	
McB:			
Maverick	80	Not limited	
MgD:			
Mirasol	85	Somewhat limited	
		Droughty	0.92
MoC:			
Moglia	85	Somewhat limited	
		Droughty	0.08

Table 10.--Rangeland Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Roller Chopping: Rating class and limiting features	Value
MwA:			
Monwebb	90	Not limited	
NfC:			
Nueces	80	Very limited	
		Droughty	1.00
NuC:			
Nusil	90	Very limited	
		Droughty	1.00
OmD:			
Olmedo	90	Very limited	
		Droughty	1.00
		Large stones	1.00
PgA:			
Papagua	90	Somewhat limited	
		Droughty	0.25
PmC:			
Pernitas	90	Somewhat limited	
		Droughty	0.05
PnB:			
Pernitas	85	Somewhat limited	
		Droughty	0.08
PRC:			
Piedras	60	Very limited	
		Large stones	1.00
		Droughty	0.18
Cuevitas	35	Somewhat limited	
		Droughty	0.50
Ps:			
Pits, quarry	100	Very limited	
		Slope	1.00
PtB:			
Premont	90	Somewhat limited	
		Droughty	0.25
ReA:			
Realitos	90	Somewhat limited	
		Droughty	0.01
SaC:			
Salco	90	Somewhat limited	
		Droughty	0.01
SnC:			
Sarita	90	Very limited	
		Droughty	1.00

Table 10.--Rangeland Roller Chopping--Continued

Map symbol and soil name	Pct. of map unit	Rangeland Roller Chopping: Rating class and limiting features	Rangeland Roller Chopping: Value
StA:			
Sinton	90	Somewhat limited	
		Droughty	0.76
TaA:			
Tela	90	Somewhat limited	
		Droughty	0.25
TcA:			
Tiocano	90	Somewhat limited	
		Droughty	0.01
WaB:			
Weesatche	87	Somewhat limited	
		Droughty	0.25
WaC:			
Weesatche	87	Somewhat limited	
		Droughty	0.25
WeB:			
Weesatche	85	Somewhat limited	
		Droughty	0.25

Table 11.--Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Valuee
AgC:					
Aguilares-----------	90	Very limited		Very limited	
		HEL wind	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Too arid	0.50
		Droughty	0.55		
		Too arid	0.50		
AlA:					
Alet----------------	85	Not limited		Not limited	
AnC:					
Annarose------------	80	Very limited		Very limited	
		HEL wind	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Too arid	0.50
		Too arid	0.50		
		Droughty	0.08		
BdC:					
Benavides-----------	90	Very limited		Very limited	
		HEL wind	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Too arid	0.50
		Too arid	0.50		
		Droughty	0.15		
BnC:					
Brennan-------------	90	Very limited		Somewhat limited	
		HEL wind	1.00	Too sandy	0.50
		Too sandy	0.50	Too arid	0.50
		Too arid	0.50		
		Droughty	0.13		
BrB:					
Brennan-------------	90	Very limited		Very limited	
		HEL wind	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Too arid	0.50
		Too arid	0.50		
		Droughty	0.01		

Table 11.--Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value
BuA:					
Brundage------------	90	Very limited		Very limited	
		Excess salt	1.00	Excess salt	1.00
		HEL wind	1.00	Potentially or highly erodible	1.00
		Percs slowly	1.00	Percs slowly	1.00
		Potentially or highly erodible	1.00	Excess sodium	1.00
		Droughty	1.00	Too arid	0.50
CaA:					
Catarina------------	90	Very limited		Very limited	
		HEL wind	1.00	Excess sodium	1.00
		Too clayey	1.00	Too clayey	1.00
		Droughty	1.00	Excess salt	1.00
		Excess salt	1.00	Percs slowly	0.50
		Excess Sodium	0.75	Droughty	0.32
CmB:					
Colmena-------------	85	Very limited		Not limited	
		HEL wind	1.00		
CoC:					
Comitas-------------	90	Very limited		Somewhat limited	
		HEL wind	1.00	Too sandy	0.50
		Droughty	1.00	Too arid	0.50
		Too sandy	0.50	Droughty	0.03
		Too arid	0.50		
CpC:					
Copita--------------	90	Very limited		Very limited	
		Droughty	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Bedrock	0.92
		Potentially or highly erodible	1.00	Droughty	0.71
		Bedrock	0.92	Too arid	0.50
		Too arid	0.50	Excess salt	0.12
CyB:					
Coy-----------------	90	Very limited		Somewhat limited	
		HEL wind	1.00	Too clayey	0.81
		Too clayey	0.81	Percs slowly	0.50
		Percs slowly	0.50		
CZA:					
Czar----------------	60	Not limited		Not limited	
Clareville----------	35	Somewhat limited		Somewhat limited	
		Too clayey	0.11	Too clayey	0.11
DaB:					
Delfina-------------	90	Very limited		Somewhat limited	
		HEL wind	1.00	Too sandy	0.50
		Too sandy	0.50		
		Droughty	0.02		

Table 11.--Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Valuee
DeA:					
Delfina	95	Very limited		Not limited	
		HEL wind	1.00		
		Droughty	0.07		
DfB:					
Delmita	90	Very limited		Somewhat limited	
		Droughty	1.00	Cemented pan	0.99
		HEL wind	1.00	Droughty	0.91
		Cemented pan	0.99	Too sandy	0.50
		Too sandy	0.50		
DmB:					
Delmita	90	Very limited		Very limited	
		HEL wind	1.00	Potentially or highly erodible	1.00
		Percs slowly	1.00	Percs slowly	1.00
		Potentially or highly erodible	1.00	Cemented pan	0.52
		Droughty	1.00	Droughty	0.01
		Cemented pan	0.52		
DRB:					
Delmita	60	Very limited		Very limited	
		HEL wind	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Cemented pan	0.91
		Droughty	1.00	Droughty	0.03
		Cemented pan	0.91		
Randado	35	Very limited		Very limited	
		Droughty	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Cemented pan	1.00
		Potentially or highly erodible	1.00	Droughty	1.00
		Cemented pan	1.00		
GeB:					
Gertrudis	90	Very limited		Not limited	
		HEL wind	1.00		
		Droughty	0.06		
GRD:					
Grava	85	Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		Droughty	1.00	Too gravelly, cobbly, or stony	1.00
		Too gravelly, cobbly, or stony	1.00	Droughty	0.90
		Cemented pan	0.86	Cemented pan	0.86
		Too clayey	0.01	Too clayey	0.01

Table 11.--Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value
HeB:					
Hebbronville--------	90	Very limited		Somewhat limited	
		HEL wind	1.00	Too arid	0.50
		Too arid	0.50		
		Droughty	0.18		
HoB:					
Houla---------------	90	Very limited		Somewhat limited	
		HEL wind	1.00	Too clayey	0.72
		Too clayey	0.72	Too arid	0.50
		Too arid	0.50		
JdB:					
Jardin--------------	90	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		HEL wind	1.00	Potentially or highly erodible	1.00
		Cemented pan	1.00	Cemented pan	1.00
		Potentially or highly erodible	1.00	Too gravelly, cobbly, or stony	1.00
		Too gravelly, cobbly, or stony	1.00		
LoC:					
Lomart--------------	85	Very limited		Very limited	
		HEL wind	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Too arid	0.50
		Droughty	1.00	Bedrock	0.46
		Too arid	0.50	Droughty	0.18
		Bedrock	0.46		
McB:					
Maverick------------	80	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Percs slowly	0.50	Percs slowly	0.50
		Too arid	0.50	Too arid	0.50
		Bedrock	0.46	Bedrock	0.46
				Excess sodium	0.08
MgD:					
Mirasol-------------	85	Very limited		Very limited	
		Droughty	1.00	Potentially or highly erodible	1.00
		Percs slowly	1.00	Percs slowly	1.00
		Cemented pan	1.00	Cemented pan	1.00
		Potentially or highly erodible	1.00	Droughty	1.00
		Too gravelly, cobbly, or stony	1.00	Too gravelly, cobbly, or stony	1.00

Table 11.--Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Valuee
MoC:					
Moglia	85	Somewhat limited		Very limited	
		Droughty	0.93	Excess sodium	1.00
		Too clayey	0.50	Too clayey	0.50
		Too arid	0.50	Too arid	0.50
		Excess Sodium	0.34	Excess salt	0.12
		Excess salt	0.12		
MwA:					
Monwebb	90	Very limited		Very limited	
		HEL wind	1.00	Too clayey	1.00
		Too clayey	1.00	Flooding	0.50
		Flooding	0.50	Percs slowly	0.50
		Percs slowly	0.50		
NfC:					
Nueces	80	Very limited		Very limited	
		HEL wind	1.00	Droughty	1.00
		Too sandy	1.00	Too sandy	0.50
		Droughty	1.00		
NuC:					
Nusil	90	Very limited		Somewhat limited	
		HEL wind	1.00	Too sandy	0.50
		Droughty	0.99		
		Too sandy	0.50		
OmD:					
Olmedo	90	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		Cemented pan	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Cemented pan	1.00
		Too gravelly, cobbly, or stony	1.00	Too gravelly, cobbly, or stony	1.00
PgA:					
Papagua	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		HEL wind	1.00	Percs slowly	0.50
		Percs slowly	0.50		
PmC:					
Pernitas	90	Very limited		Very limited	
		HEL wind	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00		
PnB:					
Pernitas	85	Not limited		Not limited	

Table 11.--Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value
PRC:					
Piedras	60	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		HEL wind	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00	Cemented pan	1.00
		Cemented pan	1.00	Percs slowly	1.00
		Percs slowly	1.00	Too gravelly, cobbly, or stony	0.73
Cuevitas	35	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
		HEL wind	1.00	Potentially or highly erodible	1.00
		Cemented pan	1.00	Cemented pan	1.00
		Potentially or highly erodible	1.00		
Ps:					
Pits, quarry	100	Not rated		Not rated	
PtB:					
Premont	90	Very limited		Not limited	
		HEL wind	1.00		
		Droughty	0.01		
ReA:					
Realitos	90	Very limited		Very limited	
		HEL wind	1.00	Too clayey	1.00
		Too clayey	1.00	Ponding	0.50
		Ponding	0.50	Percs slowly	0.50
		Percs slowly	0.50		
SaC:					
Salco	90	Very limited		Very limited	
		Potentially or highly erodible	1.00	Potentially or highly erodible	1.00
		Too arid	0.50	Too arid	0.50
SnC:					
Sarita	90	Very limited		Very limited	
		Droughty	1.00	Potentially or highly erodible	1.00
		HEL wind	1.00	Droughty	0.68
		Potentially or highly erodible	1.00	Too sandy	0.50
		Too sandy	1.00		
StA:					
Sinton	90	Somewhat limited		Somewhat limited	
		Flooding	0.50	Flooding	0.50

Table 11.--Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value
TaA:					
Tela	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
TcA:					
Tiocano	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		HEL wind	1.00	Too clayey	1.00
		Too clayey	1.00	Percs slowly	0.50
		Percs slowly	0.50		
WaB:					
Weesatche	87	Very limited		Not limited	
		HEL wind	1.00		
WaC:					
Weesatche	87	Very limited		Very limited	
		HEL wind	1.00	Potentially or highly erodible	1.00
		Potentially or highly erodible	1.00		
WeB:					
Weesatche	85	Not limited		Not limited	

Table 12.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Irrigated domestic grasses and legumes for food and cover		Habitat for burrowing mammals and reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AgC:					
Aguilares	90	Very limited		Not limited	
		Potentially or highly erodible	1.00		
AlA:					
Alet	85	Not limited		Somewhat limited	
				Flooding	0.50
				Too clayey	0.01
AnC:					
Annarose	80	Very limited		Not limited	
		Potentially or highly erodible	1.00		
BdC:					
Benavides	90	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too clayey	0.11
BnC:					
Brennan	90	Not limited		Not limited	
BrB:					
Brennan	90	Very limited		Not limited	
		Potentially or highly erodible	1.00		
BuA:					
Brundage	90	Very limited		Somewhat limited	
		Excess salt	1.00	Flooding	0.50
		Potentially or highly erodible	1.00	Too clayey	0.03
		Percs slowly	1.00		
		Excess Sodium	0.66		
		Droughty	0.03		
CaA:					
Catarina	90	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Excess salt	1.00		
		Excess Sodium	0.75		
		Percs slowly	0.50		
		Droughty	0.32		

Table 12.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated domestic grasses and legumes for food and cover: Rating class and limiting features	Value	Habitat for burrowing mammals and reptiles: Rating class and limiting features	Value
CmB:					
Colmena	85	Not limited		Not limited	
CoC:					
Comitas	90	Somewhat limited		Not limited	
		Droughty	0.03		
CpC:					
Copita	90	Very limited		Not limited	
		Potentially or highly erodible	1.00		
		Bedrock	0.92		
		Droughty	0.71		
		Excess salt	0.12		
CyB:					
Coy	90	Somewhat limited		Very limited	
		Too clayey	0.81	Too clayey	1.00
		Percs slowly	0.50		
CZA:					
Czar	60	Not limited		Somewhat limited	
				Flooding	0.50
				Too clayey	0.11
Clareville	35	Somewhat limited		Very limited	
		Too clayey	0.11	Too clayey	1.00
				Flooding	0.50
DaB:					
Delfina	90	Not limited		Somewhat limited	
				Too clayey	0.11
DeA:					
Delfina	95	Not limited		Somewhat limited	
				Too clayey	0.11
DfB:					
Delmita	90	Somewhat limited		Not limited	
		Cemented pan	0.99		
		Droughty	0.91		
DmB:					
Delmita	90	Very limited		Not limited	
		Potentially or highly erodible	1.00		
		Percs slowly	1.00		
		Cemented pan	0.52		
		Droughty	0.01		

Table 12.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated domestic grasses and legumes for food and cover		Habitat for burrowing mammals and reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
DRB:					
Delmita	60	Very limited		Not limited	
		Potentially or highly erodible	1.00		
		Cemented pan	0.91		
		Droughty	0.03		
Randado	35	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Cemented pan	0.46
		Cemented pan	1.00		
		Droughty	1.00		
GeB:					
Gertrudis	90	Not limited		Not limited	
GRD:					
Grava	85	Very limited		Very limited	
		Potentially or highly erodible	1.00	Too clayey	1.00
		Too gravelly, cobbly, or stony	1.00	Too gravelly	1.00
		Droughty	0.90		
		Cemented pan	0.86		
		Slope	0.12		
HeB:					
Hebbronville	90	Not limited		Not limited	
HoB:					
Houla	90	Somewhat limited		Somewhat limited	
		Too clayey	0.72	Too clayey	0.47
JdB:					
Jardin	90	Very limited		Somewhat limited	
		Droughty	1.00	Cemented pan	0.46
		Potentially or highly erodible	1.00	Content of large stones	0.22
		Cemented pan	1.00	Too gravelly	0.01
		Too gravelly, cobbly, or stony	1.00		
LoC:					
Lomart	85	Very limited		Not limited	
		Potentially or highly erodible	1.00		
		Bedrock	0.46		
		Droughty	0.18		

Table 12.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated domestic grasses and legumes for food and cover: Rating class and limiting features	Value	Habitat for burrowing mammals and reptiles: Rating class and limiting features	Value
McB:					
Maverick	80	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
		Percs slowly	0.50		
		Bedrock	0.46		
MgD:					
Mirasol	85	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Cemented pan	0.16
		Percs slowly	1.00	Too gravelly	0.01
		Cemented pan	1.00		
		Droughty	1.00		
		Too gravelly, cobbly, or stony	1.00		
MoC:					
Moglia	85	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.86
		Excess Sodium	0.34		
		Excess salt	0.12		
MwA:					
Monwebb	90	Very limited		Very limited	
		Too clayey	1.00	Flooding	1.00
		Flooding	0.50	Too clayey	1.00
		Percs slowly	0.50		
NfC:					
Nueces	80	Very limited		Somewhat limited	
		Droughty	1.00	Too Sandy	0.50
		Too sandy	0.50		
NuC:					
Nusil	90	Not limited		Not limited	
OmD:					
Olmedo	90	Very limited		Somewhat limited	
		Droughty	1.00	Content of large stones	0.78
		Potentially or highly erodible	1.00	Too gravelly	0.37
		Cemented pan	1.00	Cemented pan	0.05
		Too gravelly, cobbly, or stony	1.00		
		Slope	0.12		

Table 12.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated domestic grasses and legumes for food and cover		Habitat for burrowing mammals and reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
PgA:					
Papagua-------------	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Percs slowly	0.50	Too clayey	0.99
PmC:					
Pernitas------------	90	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too clayey	0.11
PnB:					
Pernitas------------	85	Not limited		Somewhat limited	
				Too clayey	0.36
PRC:					
Piedras-------------	60	Very limited		Somewhat limited	
		Droughty	1.00	Content of large stones	0.78
		Potentially or highly erodible	1.00	Cemented pan	0.46
		Cemented pan	1.00		
		Percs slowly	1.00		
		Too gravelly, cobbly, or stony	0.73		
Cuevitas------------	35	Very limited		Very limited	
		Droughty	1.00	Cemented pan	1.00
		Potentially or highly erodible	1.00		
		Cemented pan	1.00		
Ps:					
Pits, quarry--------	100	Not rated		Not rated	
PtB:					
Premont-------------	90	Not limited		Somewhat limited	
				Too clayey	0.11
ReA:					
Realitos------------	90	Very limited		Very limited	
		Too clayey	1.00	Ponding	1.00
		Ponding	0.50	Too clayey	1.00
		Percs slowly	0.50		
SaC:					
Salco---------------	90	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too clayey	0.11

Table 12.--Irrigated Domestic Grasses and Legumes for Food and Cover, and Habitat for Burrowing Mammals and Reptiles--Continued

Map symbol and soil name	Pct. of map unit	Irrigated domestic grasses and legumes for food and cover		Habitat for burrowing mammals and reptiles	
		Rating class and limiting features	Value	Rating class and limiting features	Value
SnC:					
Sarita	90	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too Sandy	0.50
		Droughty	0.68		
		Too sandy	0.50		
StA:					
Sinton	90	Somewhat limited		Very limited	
		Flooding	0.50	Flooding	1.00
				Too clayey	0.01
TaA:					
Tela	90	Not limited		Somewhat limited	
				Flooding	0.50
TcA:					
Tiocano	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Too clayey	1.00
		Percs slowly	0.50		
WaB:					
Weesatche	87	Not limited		Somewhat limited	
				Too clayey	0.01
WaC:					
Weesatche	87	Very limited		Somewhat limited	
		Potentially or highly erodible	1.00	Too clayey	0.01
WeB:					
Weesatche	85	Not limited		Somewhat limited	
				Too clayey	0.11

Table 13.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Food and Cover

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Upland native herbaceous plants for food and cover: Rating class and limiting features	Value	Upland shrubs and vines for food and cover: Rating class and limiting features	Value
AgC:					
Aguilares	90	Not limited		Very limited	
				Bedrock	1.00
				Extreme soil temperatures	0.50
AlA:					
Alet	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
AnC:					
Annarose	80	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
BdC:					
Benavides	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
BnC:					
Brennan	90	Somewhat limited		Somewhat limited	
		Sandy surface	0.40	Extreme soil temperatures	0.50
				Sandy surface	0.40
BrB:					
Brennan	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
BuA:					
Brundage	90	Very limited		Very limited	
		Excess salt	1.00	Excess salt	1.00
		Excess sodium	1.00	Excess Sodium	0.66
				Extreme soil temperatures	0.50
CaA:					
Catarina	90	Very limited		Somewhat limited	
		Excess sodium	1.00	Excess Sodium	0.75
		Excess salt	0.50	Excess salt	0.50
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50

Table 13.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Upland native herbaceous plants for food and cover: Rating class and limiting features	Value	Upland shrubs and vines for food and cover: Rating class and limiting features	Value
CmB:					
Colmena	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
CoC:					
Comitas	90	Somewhat limited		Somewhat limited	
		Sandy surface	0.40	Extreme soil temperatures	0.50
				Sandy surface	0.40
CpC:					
Copita	90	Somewhat limited		Somewhat limited	
		Excess salt	0.01	Bedrock	0.60
				Extreme soil temperatures	0.50
				Excess salt	0.01
CyB:					
Coy	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
CZA:					
Czar	60	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
Clareville	35	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
DaB:					
Delfina	90	Somewhat limited		Somewhat limited	
		Sandy surface	0.40	Extreme soil temperatures	0.50
				Sandy surface	0.40
DeA:					
Delfina	95	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
DfB:					
Delmita	90	Somewhat limited		Somewhat limited	
		Sandy surface	0.40	Extreme soil temperatures	0.50
				Cemented pan	0.48
				Sandy surface	0.40
DmB:					
Delmita	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
				Cemented pan	0.01

Table 13.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Upland native herbaceous plants for food and cover: Rating class and limiting features	Value	Upland shrubs and vines for food and cover: Rating class and limiting features	Value
DRB:					
Delmita	60	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
				Cemented pan	0.21
Randado	35	Somewhat limited		Somewhat limited	
		Droughty	0.50	Cemented pan	0.81
				Extreme soil temperatures	0.50
				Droughty	0.50
GeB:					
Gertrudis	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
GRD:					
Grava	85	Somewhat limited		Somewhat limited	
		Too gravelly, cobbly, or stony	0.03	Extreme soil temperatures	0.50
				Cemented pan	0.14
				Too gravelly, cobbly, or stony	0.03
HeB:					
Hebbronville	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
HoB:					
Houla	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
JdB:					
Jardin	90	Somewhat limited		Somewhat limited	
		Droughty	0.50	Cemented pan	0.81
		Too gravelly, cobbly, or stony	0.20	Droughty	0.50
				Extreme soil temperatures	0.50
				Too gravelly, cobbly, or stony	0.20
LoC:					
Lomart	85	Not limited		Somewhat limited	
				Bedrock	0.86
				Extreme soil temperatures	0.50

Table 13.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Upland native herbaceous plants for food and cover: Rating class and limiting features	Value	Upland shrubs and vines for food and cover: Rating class and limiting features	Value
McB:					
Maverick	80	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Bedrock	0.86
		Excess sodium	0.08	Too clayey	0.50
				Extreme soil temperatures	0.50
MgD:					
Mirasol	85	Somewhat limited		Somewhat limited	
		Droughty	0.50	Cemented pan	0.73
		Too gravelly, cobbly, or stony	0.01	Extreme soil temperatures	0.50
				Droughty	0.50
				Too gravelly, cobbly, or stony	0.01
MoC:					
Moglia	85	Very limited		Somewhat limited	
		Excess sodium	1.00	Extreme soil temperatures	0.50
		Excess salt	0.01	Excess Sodium	0.34
				Excess salt	0.01
MwA:					
Monwebb	90	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
NfC:					
Nueces	80	Somewhat limited		Somewhat limited	
		Sandy surface	0.60	Sandy surface	0.60
		Droughty	0.50	Extreme soil temperatures	0.50
				Droughty	0.50
NuC:					
Nusil	90	Somewhat limited		Somewhat limited	
		Sandy surface	0.40	Extreme soil temperatures	0.50
				Sandy surface	0.40
OmD:					
Olmedo	90	Somewhat limited		Somewhat limited	
		Too gravelly, cobbly, or stony	0.63	Cemented pan	0.68
		Droughty	0.50	Too gravelly, cobbly, or stony	0.63
				Droughty	0.50
				Extreme soil temperatures	0.50

Table 13.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Upland native herbaceous plants for food and cover: Rating class and limiting features	Value	Upland shrubs and vines for food and cover: Rating class and limiting features	Value
PgA:					
Papagua	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Extreme soil temperatures	0.50
PmC:					
Pernitas	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
PnB:					
Pernitas	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
PRC:					
Piedras	60	Somewhat limited		Somewhat limited	
		Droughty	0.50	Cemented pan	0.81
				Droughty	0.50
				Extreme soil temperatures	0.50
Cuevitas	35	Somewhat limited		Somewhat limited	
		Droughty	0.50	Cemented pan	0.98
				Droughty	0.50
				Extreme soil temperatures	0.50
Ps:					
Pits, quarry	100	Not rated		Not rated	
PtB:					
Premont	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
ReA:					
Realitos	90	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
SaC:					
Salco	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
SnC:					
Sarita	90	Somewhat limited		Somewhat limited	
		Sandy surface	0.60	Sandy surface	0.60
				Extreme soil temperatures	0.50

Table 13.--Upland Native Herbaceous Plants, and Upland Shrubs and Vines for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Upland native herbaceous plants for food and cover		Upland shrubs and vines for food and cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value
StA:					
Sinton	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
TaA:					
Tela	90	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
TcA:					
Tiocano	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50	Too clayey	0.50
				Extreme soil temperatures	0.50
WaB:					
Weesatche	87	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
WaC:					
Weesatche	87	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50
WeB:					
Weesatche	85	Not limited		Somewhat limited	
				Extreme soil temperatures	0.50

Table 14.--Riparian Herbaceous Plants, Shrubs, Vines and Trees, and Freshwater Plants for Food and Cover

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Riparian herbaceous plants: Rating class and limiting features	Value	Riparian shrubs, vines, and trees: Rating class and limiting features	Value	Freshwater wetland plants: Rating class and limiting features	Value
AgC:							
Aguilares-----------	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00			Too alkaline	1.00
AlA:							
Alet----------------	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00			Excess salt	0.01
AnC:							
Annarose------------	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
BdC:							
Benavides-----------	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
BnC:							
Brennan-------------	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
		Too sandy	0.50				
BrB:							
Brennan-------------	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
BuA:							
Brundage------------	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.03	Excess salt	0.01
CaA:							
Catarina------------	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.32	Excess salt	1.00
		Excess sodium	0.05	Excess sodium	0.11	Excess sodium	1.00
		Excess salt	0.01	Excess salt	0.01		

Table 14.--Riparian Herbaceous Plants, Shrubs, Vines and Trees, and Freshwater Plants for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Riparian herbaceous plants: Rating class and limiting features	Value	Riparian shrubs, vines, and trees: Rating class and limiting features	Value	Freshwater wetland plants: Rating class and limiting features	Value
CmB:							
Colmena	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
CoC:							
Comitas	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.03	Too acid	0.32
		Too sandy	0.50				
CpC:							
Copita	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.71	Excess salt	0.01
CyB:							
Coy	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
CZA:							
Czar	60	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
Clareville	35	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
DaB:							
Delfina	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
		Too sandy	0.50				
DeA:							
Delfina	95	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
DfB:							
Delmita	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.91		
		Too sandy	0.50				

Table 14.--Riparian Herbaceous Plants, Shrubs, Vines and Trees, and Freshwater Plants for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Riparian herbaceous plants: Rating class and limiting features	Value	Riparian shrubs, vines, and trees: Rating class and limiting features	Value	Freshwater wetland plants: Rating class and limiting features	Value
DmB:							
Delmita	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.01		
DRB:							
Delmita	60	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.03		
Randado	35	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	1.00		
GeB:							
Gertrudis	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00			Excess salt	0.01
GRD:							
Grava	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.90		
		Too gravelly, cobbly, or stony	0.12				
HeB:							
Hebbronville	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
HoB:							
Houla	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
JdB:							
Jardin	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	1.00		
		Too gravelly, cobbly, or stony	0.74				
LoC:							
Lomart	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	0.18		

Table 14.--Riparian Herbaceous Plants, Shrubs, Vines and Trees, and Freshwater Plants for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Riparian herbaceous plants: Rating class and limiting features	Value	Riparian shrubs, vines, and trees: Rating class and limiting features	Value	Freshwater wetland plants: Rating class and limiting features	Value
McB:							
Maverick	80	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	1.00		
		Too gravelly, cobbly, or stony	0.05				
MoC:							
Moglia	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
MwA:							
Monwebb	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00			Excess salt	0.01
NfC:							
Nueces	80	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too dry	1.00	Too dry	1.00
		Too dry	1.00	Droughty	1.00	Too sandy	0.50
		Infrequent flooding	1.00			Too acid	0.32
NuC:							
Nusil	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
		Too sandy	0.50				
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	1.00		
		Too gravelly, cobbly, or stony	1.00				
PgA:							
Papagua	90	Very limited		Very limited		Not limited	
		Infrequent flooding	1.00	Ponding	1.00		
		Ponding	0.50				

Table 14.--Riparian Herbaceous Plants, Shrubs, Vines and Trees, and Freshwater Plants for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Riparian herbaceous plants: Rating class and limiting features	Value	Riparian shrubs, vines, and trees: Rating class and limiting features	Value	Freshwater wetland plants: Rating class and limiting features	Value
PmC:							
Pernitas	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
PnB:							
Pernitas	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
PRC:							
Piedras	60	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	1.00		
Cuevitas	35	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Droughty	1.00		
Ps:							
Pits, quarry	100	Not rated		Not rated		Not rated	
PtB:							
Premont	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
ReA:							
Realitos	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00	Ponding	0.50	Excess salt	0.01
SaC:							
Salco	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
SnC:							
Sarita	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too dry	1.00	Too dry	1.00
		Too dry	1.00	Droughty	0.68	Too sandy	0.50
		Infrequent flooding	1.00				
StA:							
Sinton	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				

Table 14.--Riparian Herbaceous Plants, Shrubs, Vines and Trees, and Freshwater Plants for Food and Cover--Continued

Map symbol and soil name	Pct. of map unit	Riparian herbaceous plants: Rating class and limiting features	Value	Riparian shrubs, vines, and trees: Rating class and limiting features	Value	Freshwater wetland plants: Rating class and limiting features	Value
TaA:							
Tela	90	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
TcA:							
Tiocano	90	Very limited		Very limited		Somewhat limited	
		Infrequent flooding	1.00	Ponding	1.00	Excess salt	0.01
		Ponding	0.50				
WaB:							
Weesatche	87	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
WaC:							
Weesatche	87	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				
WeB:							
Weesatche	85	Very limited		Very limited		Very limited	
		Too dry	1.00	Too dry	1.00	Too dry	1.00
		Infrequent flooding	1.00				

Table 15.--Camp Areas, Picnic Areas, and Playgrounds

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgC:							
Aguilares	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.01	Too sandy	0.01	Too sandy	0.01
AlA:							
Alet	85	Very limited		Not limited		Not limited	
		Flooding	1.00				
AnC:							
Annarose	80	Not limited		Not limited		Somewhat limited	
						Slope	0.50
BdC:							
Benavides	90	Not limited		Not limited		Somewhat limited	
						Slope	0.50
BnC:							
Brennan	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.94	Too sandy	0.94	Too sandy	0.94
						Slope	0.12
BrB:							
Brennan	90	Not limited		Not limited		Not limited	
BuA:							
Brundage	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Slow water movement	0.45	Slow water movement	0.45
		Slow water movement	0.45				
CaA:							
Catarina	90	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
		Salinity	0.01	Salinity	0.01	Salinity	0.01
CmB:							
Colmena	85	Not limited		Not limited		Not limited	
CoC:							
Comitas	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.94	Too sandy	0.94	Too sandy	0.94
						Slope	0.12
CpC:							
Copita	90	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.92
						Slope	0.12

Table 15.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
CyB:							
Coy	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
CZA:							
Czar	60	Very limited		Not limited		Not limited	
		Flooding	1.00				
Clareville	35	Very limited		Not limited		Not limited	
		Flooding	1.00				
DaB:							
Delfina	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.50	Too sandy	0.50	Too sandy	0.50
DeA:							
Delfina	95	Not limited		Not limited		Not limited	
DfB:							
Delmita	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to cemented pan	0.97	Depth to cemented pan	0.97	Too sandy	0.89
		Too sandy	0.89	Too sandy	0.89		
DmB:							
Delmita	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
		Depth to cemented pan	0.01	Depth to cemented pan	0.01		
DRB:							
Delmita	60	Somewhat limited		Somewhat limited		Not limited	
		Depth to cemented pan	0.65	Depth to cemented pan	0.65		
Randado	35	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
						Gravel	0.18
GeB:							
Gertrudis	90	Not limited		Not limited		Not limited	
GRD:							
Grava	85	Very limited		Very limited		Very limited	
		Gravel	1.00	Gravel	1.00	Gravel	1.00
		Depth to cemented pan	0.46	Depth to cemented pan	0.46	Slope	0.88
		Slow water movement	0.05	Slow water movement	0.05	Depth to cemented pan	0.46
						Slow water movement	0.05

Table 15.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
HeB:							
Hebbronville	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12	Too sandy	0.12
HoB:							
Houla	90	Not limited		Not limited		Not limited	
JdB:							
Jardin	90	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Gravel	1.00
		Gravel	1.00	Gravel	1.00	Depth to cemented pan	1.00
LoC:							
Lomart	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Depth to bedrock	0.46
						Slope	0.12
McB:							
Maverick	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Gravel	1.00
		Gravel	1.00	Gravel	1.00	Depth to cemented pan	1.00
		Slow water movement	0.45	Slow water movement	0.45	Slope	0.88
						Slow water movement	0.45
MoC:							
Moglia	85	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
MwA:							
Monwebb	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Too clayey	0.50	Flooding	0.60
		Too clayey	0.50	Slow water movement	0.45	Too clayey	0.50
		Slow water movement	0.45			Slow water movement	0.45
NfC:							
Nueces	80	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00
						Slope	0.12

Table 15.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
NuC:							
Nusil	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.34	Too sandy	0.34	Too sandy	0.34
						Slope	0.12
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Gravel	1.00
		Gravel	1.00	Gravel	1.00	Depth to cemented pan	1.00
						Slope	0.88
PgA:							
Papagua	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Slow water movement	0.96	Slow water movement	0.96	Slow water movement	0.96
PmC:							
Pernitas	90	Not limited		Not limited		Not limited	
PnB:							
Pernitas	85	Not limited		Not limited		Not limited	
PRC:							
Piedras	60	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Large stones content	1.00	Large stones content	1.00	Large stones content	1.00
		Slow water movement	0.45	Slow water movement	0.45	Gravel	0.84
						Slow water movement	0.45
						Slope	0.12
Cuevitas	35	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
Ps:							
Pits, quarry	100	Not rated		Not rated		Not rated	
PtB:							
Premont	90	Not limited		Not limited		Not limited	
ReA:							
Realitos	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45

Table 15.--Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
SaC:							
Salco	90	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Slope	0.12
SnC:							
Sarita	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00
StA:							
Sinton	90	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
TaA:							
Tela	90	Very limited		Not limited		Not limited	
		Flooding	1.00				
TcA:							
Tiocano	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
WaB:							
Weesatche	87	Not limited		Not limited		Not limited	
WaC:							
Weesatche	87	Not limited		Not limited		Somewhat limited	
						Slope	0.50
WeB:							
Weesatche	85	Not limited		Not limited		Not limited	

Table 16.--Paths, Trails, and Golf Course Fairways

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgC:							
Aguilares-----------	90	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.01	Too sandy	0.01		
AlA:							
Alet----------------	85	Not limited		Not limited		Not limited	
AnC:							
Annarose------------	80	Not limited		Not limited		Not limited	
BdC:							
Benavides-----------	90	Not limited		Not limited		Not limited	
BnC:							
Brennan-------------	90	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.94	Too sandy	0.94		
BrB:							
Brennan-------------	90	Not limited		Not limited		Not limited	
BuA:							
Brundage------------	90	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.04
CaA:							
Catarina------------	90	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Sodium content	1.00
						Too clayey	1.00
						Droughty	0.34
						Salinity	0.01
CmB:							
Colmena-------------	85	Not limited		Not limited		Not limited	
CoC:							
Comitas-------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.94	Too sandy	0.94	Droughty	0.04
CpC:							
Copita--------------	90	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.92
						Droughty	0.72
CyB:							
Coy-----------------	90	Not limited		Not limited		Not limited	
CZA:							
Czar----------------	60	Not limited		Not limited		Not limited	
Clareville----------	35	Not limited		Not limited		Not limited	

Table 16.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DaB:							
Delfina	90	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.50	Too sandy	0.50		
DeA:							
Delfina	95	Not limited		Not limited		Not limited	
DfB:							
Delmita	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.89	Too sandy	0.89	Depth to cemented pan	0.97
						Droughty	0.92
DmB:							
Delmita	90	Not limited		Not limited		Somewhat limited	
						Droughty	0.01
						Depth to cemented pan	0.01
DRB:							
Delmita	60	Not limited		Not limited		Somewhat limited	
						Depth to cemented pan	0.64
						Droughty	0.04
Randado	35	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Droughty	1.00
GeB:							
Gertrudis	90	Not limited		Not limited		Not limited	
GRD:							
Grava	85	Not limited		Not limited		Very limited	
						Gravel	1.00
						Droughty	0.90
						Depth to cemented pan	0.46
HeB:							
Hebbronville	90	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.12	Too sandy	0.12		
HoB:							
Houla	90	Not limited		Not limited		Not limited	
JdB:							
Jardin	90	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Droughty	1.00
						Gravel	1.00
						Carbonate content	1.00
						Large stones	0.32

Table 16.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf course fairways: Rating class and limiting features	Value
LoC:							
Lomart	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	0.46
						Droughty	0.20
McB:							
Maverick	80	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Sodium content	1.00
						Too clayey	1.00
						Depth to bedrock	0.46
MgD:							
Mirasol	85	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Droughty	1.00
						Gravel	1.00
MoC:							
Moglia	85	Not limited		Not limited		Very limited	
						Sodium content	1.00
MwA:							
Monwebb	90	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Sodium content	1.00
						Flooding	0.60
NfC:							
Nueces	80	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	1.00
NuC:							
Nusil	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.34	Too sandy	0.34	Droughty	0.01
OmD:							
Olmedo	90	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Droughty	1.00
						Gravel	1.00
						Carbonate content	1.00
						Large stones	0.68
PgA:							
Papagua	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Ponding	1.00	Depth to saturated zone	1.00
PmC:							
Pernitas	90	Not limited		Not limited		Not limited	
PnB:							
Pernitas	85	Not limited		Not limited		Not limited	

Table 16.--Paths, Trails, and Golf Course Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf course fairways: Rating class and limiting features	Value
PRC:							
Piedras	60	Very limited		Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00	Depth to cemented pan	1.00
						Droughty	1.00
						Large stones	0.68
Cuevitas	35	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Droughty	1.00
Ps:							
Pits, quarry	100	Not rated		Not rated		Not rated	
PtB:							
Premont	90	Not limited		Not limited		Not limited	
ReA:							
Realitos	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
SaC:							
Salco	90	Not limited		Not limited		Very limited	
						Sodium content	1.00
SnC:							
Sarita	90	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.69
StA:							
Sinton	90	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
TaA:							
Tela	90	Not limited		Not limited		Not limited	
TcA:							
Tiocano	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
WaB:							
Weesatche	87	Not limited		Not limited		Not limited	
WaC:							
Weesatche	87	Not limited		Not limited		Not limited	
WeB:							
Weesatche	85	Not limited		Not limited		Not limited	

Table 17.--Dwellings and Small Commercial Buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgC:							
Aguilares	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
AlA:							
Alet	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
AnC:							
Annarose	80	Not limited		Not limited		Not limited	
BdC:							
Benavides	90	Not limited		Not limited		Not limited	
BnC:							
Brennan	90	Not limited		Not limited		Not limited	
BrB:							
Brennan	90	Not limited		Not limited		Not limited	
BuA:							
Brundage	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
CaA:							
Catarina	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
CmB:							
Colmena	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
CoC:							
Comitas	90	Not limited		Not limited		Not limited	
CpC:							
Copita	90	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.92		
CyB:							
Coy	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
CZA:							
Czar	60	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Clareville	35	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00

Table 17.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
DaB:							
Delfina	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
DeA:							
Delfina	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
DfB:							
Delmita	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to thick cemented pan	0.97	Depth to thick cemented pan	1.00	Depth to thick cemented pan	0.97
DmB:							
Delmita	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to thick cemented pan	0.01	Depth to thick cemented pan	1.00	Depth to thick cemented pan	0.01
DRB:							
Delmita	60	Somewhat limited		Very limited		Somewhat limited	
		Depth to thick cemented pan	0.65	Depth to thick cemented pan	1.00	Depth to thick cemented pan	0.65
Randado	35	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00
GeB:							
Gertrudis	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
GRD:							
Grava	85	Somewhat limited		Very limited		Somewhat limited	
		Depth to thick cemented pan	0.46	Depth to thick cemented pan	1.00	Depth to thick cemented pan	0.46
						Slope	0.12
HeB:							
Hebbronville	90	Not limited		Not limited		Not limited	
HoB:							
Houla	90	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
JdB:							
Jardin	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00
LoC:							
Lomart	85	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.46		
McB:							
Maverick	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46		

Table 17.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00
						Slope	0.12
MoC:							
Moglia	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
MwA:							
Monwebb	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
NfC:							
Nueces	80	Not limited		Not limited		Not limited	
NuC:							
Nusil	90	Not limited		Somewhat limited		Not limited	
				Shrink-swell	0.50		
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00
						Slope	0.12
PgA:							
Papagua	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
PmC:							
Pernitas	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
PnB:							
Pernitas	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
PRC:							
Piedras	60	Somewhat limited		Very limited		Somewhat limited	
		Depth to thick cemented pan	0.95	Depth to thick cemented pan	1.00	Depth to thin cemented pan	1.00
		Depth to thin cemented pan	0.50	Depth to thin cemented pan	1.00	Depth to thick cemented pan	0.95
Cuevitas	35	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00
Ps:							
Pits, quarry	100	Not rated		Not rated		Not rated	

Table 17.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
PtB:							
Premont	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
ReA:							
Realitos	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
SaC:							
Salco	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
SnC:							
Sarita	90	Not limited		Not limited		Not limited	
StA:							
Sinton	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
TaA:							
Tela	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
TcA:							
Tiocano	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
WaB:							
Weesatche	87	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
WaC:							
Weesatche	87	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
WeB:							
Weesatche	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgC:							
Aguilares	90	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
AlA:							
Alet	85	Somewhat limited		Somewhat limited		Not limited	
		Flooding	0.40	Cutbanks cave	0.10		
AnC:							
Annarose	80	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		
BdC:							
Benavides	90	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
BnC:							
Brennan	90	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
BrB:							
Brennan	90	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
BuA:							
Brundage	90	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Cutbanks cave	0.10	Sodium content	1.00
		Flooding	0.40			Droughty	0.04
		Low strength	0.22				
CaA:							
Catarina	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Sodium content	1.00
		Low strength	1.00	Too clayey	0.50	Too clayey	1.00
						Droughty	0.34
						Salinity	0.01
CmB:							
Colmena	85	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
CoC:							
Comitas	90	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.04
CpC:							
Copita	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Low strength	0.78	Depth to soft bedrock	0.92	Depth to bedrock	0.92
				Cutbanks cave	0.10	Droughty	0.72

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
CyB:							
Coy	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Too clayey	0.28		
		Shrink-swell	1.00	Cutbanks cave	0.10		
CZA:							
Czar	60	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	1.00				
		Flooding	0.40				
Clareville	35	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	1.00	Too clayey	0.01		
		Flooding	0.40				
DaB:							
Delfina	90	Somewhat limited		Somewhat limited		Not limited	
		Low strength	0.78	Cutbanks cave	0.10		
		Shrink-swell	0.50				
DeA:							
Delfina	95	Somewhat limited		Somewhat limited		Not limited	
		Low strength	0.78	Cutbanks cave	0.10		
		Shrink-swell	0.50				
DfB:							
Delmita	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to thick cemented pan	0.97	Depth to thick cemented pan	1.00	Depth to cemented pan	0.97
				Cutbanks cave	0.10	Droughty	0.92
DmB:							
Delmita	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to thick cemented pan	0.01	Depth to thick cemented pan	1.00	Droughty	0.01
				Cutbanks cave	0.10	Depth to cemented pan	0.01
DRB:							
Delmita	60	Somewhat limited		Very limited		Somewhat limited	
		Depth to thick cemented pan	0.65	Depth to thick cemented pan	1.00	Depth to cemented pan	0.64
				Cutbanks cave	0.10	Droughty	0.04
Randado	35	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to cemented pan	1.00
						Droughty	1.00
GeB:							
Gertrudis	90	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Low strength	0.22				

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
GRD:							
Grava	85	Somewhat limited		Very limited		Very limited	
		Depth to thick cemented pan	0.46	Depth to thick cemented pan	1.00	Gravel	1.00
				Cutbanks cave	1.00	Droughty	0.90
				Too clayey	0.41	Depth to cemented pan	0.46
HeB:							
Hebbronville	90	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
HoB:							
Houla	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
JdB:							
Jardin	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to cemented pan	1.00
						Droughty	1.00
						Gravel	1.00
						Carbonate content	1.00
						Large stones	0.32
LoC:							
Lomart	85	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10	Droughty	0.20
McB:							
Maverick	80	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.99	Sodium content	1.00
		Low strength	1.00	Depth to soft bedrock	0.46	Too clayey	1.00
				Cutbanks cave	0.10	Depth to bedrock	0.46
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to cemented pan	1.00
				Cutbanks cave	0.10	Droughty	1.00
						Gravel	1.00
MoC:							
Moglia	85	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Cutbanks cave	0.10	Sodium content	1.00
		Shrink-swell	0.50				
MwA:							
Monwebb	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Flooding	1.00	Flooding	0.60	Sodium content	1.00
		Low strength	1.00	Too clayey	0.50	Flooding	0.60

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
NfC:							
Nueces	80	Not limited		Very limited		Very limited	
				Cutbanks cave	1.00	Droughty	1.00
NuC:							
Nusil	90	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.01
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to cemented pan	1.00
				Cutbanks cave	1.00	Droughty	1.00
						Gravel	1.00
						Carbonate content	1.00
						Large stones	0.68
PgA:							
Papagua	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
PmC:							
Pernitas	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
PnB:							
Pernitas	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
PRC:							
Piedras	60	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to cemented pan	1.00
		Depth to thick cemented pan	0.95	Depth to thin cemented pan	1.00	Droughty	1.00
						Large stones	0.68
Cuevitas	35	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to thick cemented pan	1.00	Depth to cemented pan	1.00
						Droughty	1.00
Ps:							
Pits, quarry	100	Not rated		Not rated		Not rated	
PtB:							
Premont	90	Somewhat limited		Somewhat limited		Not limited	
		Low strength	0.78	Cutbanks cave	0.10		
		Shrink-swell	0.50				

Table 18.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ReA:							
Realitos	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.50		
SaC:							
Salco	90	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Cutbanks cave	0.10	Sodium content	1.00
		Low strength	0.22				
SnC:							
Sarita	90	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.69
StA:							
Sinton	90	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
				Cutbanks cave	0.10		
TaA:							
Tela	90	Somewhat limited		Somewhat limited		Not limited	
		Flooding	0.40	Cutbanks cave	0.10		
TcA:							
Tiocano	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.50		
WaB:							
Weesatche	87	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
WaC:							
Weesatche	87	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
WeB:							
Weesatche	85	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		

Table 19.--Sewage Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AgC:					
Aguilares	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
AlA:					
Alet	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.68	Flooding	0.40
		Flooding	0.40	Seepage	0.32
AnC:					
Annarose	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
				Slope	0.32
BdC:					
Benavides	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.68	Seepage	0.32
				Slope	0.32
BnC:					
Brennan	90	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
				Slope	0.08
BrB:					
Brennan	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
BuA:					
Brundage	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Flooding	0.40
		Flooding	0.40		
CaA:					
Catarina	90	Very limited		Not limited	
		Slow water movement	1.00		
CmB:					
Colmena	85	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	0.99

Table 19.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
CoC:					
Comitas	90	Not limited		Very limited	
				Seepage	1.00
				Slope	0.08
CpC:					
Copita	90	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	0.99
				Slope	0.08
CyB:					
Coy	90	Very limited		Not limited	
		Slow water movement	1.00		
CZA:					
Czar	60	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
		Flooding	0.40	Flooding	0.40
Clareville	35	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
		Flooding	0.40	Flooding	0.40
DaB:					
Delfina	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
DeA:					
Delfina	95	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
DfB:					
Delmita	90	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Seepage	0.50
DmB:					
Delmita	90	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	0.50	Seepage	0.50

Table 19.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
DRB:					
Delmita	60	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	0.50	Seepage	0.50
Randado	35	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Seepage	0.50
GeB:					
Gertrudis	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
GRD:					
Grava	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	1.00	Slope	0.68
HeB:					
Hebbronville	90	Not limited		Very limited	
				Seepage	1.00
HoB:					
Houla	90	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
JdB:					
Jardin	90	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Seepage	0.50
LoC:					
Lomart	85	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	1.00
				Slope	0.08
McB:					
Maverick	80	Very limited		Very limited	
		Slow water movement	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00		

Table 19.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
MgD:					
Mirasol	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Slope	0.68
				Seepage	0.50
MoC:					
Moglia	85	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
MwA:					
Monwebb	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	1.00		
NfC:					
Nueces	80	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
				Slope	0.08
NuC:					
Nusil	90	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
				Slope	0.08
OmD:					
Olmedo	90	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Slope	0.68
				Seepage	0.50
PgA:					
Papagua	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
PmC:					
Pernitas	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
PnB:					
Pernitas	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50

Table 19.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
PRC:					
Piedras	60	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Slope	0.08
Cuevitas	35	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
Ps:					
Pits, quarry	100	Not rated		Not rated	
PtB:					
Premont	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
ReA:					
Realitos	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00		
SaC:					
Salco	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
				Slope	0.08
SnC:					
Sarita	90	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
StA:					
Sinton	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.50	Seepage	1.00
TaA:					
Tela	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
		Flooding	0.40	Flooding	0.40
TcA:					
Tiocano	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		

Table 19.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
WaB:					
Weesatche-----------	87	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
WaC:					
Weesatche-----------	87	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
				Slope	0.32
WeB:					
Weesatche-----------	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50

Table 20.--Landfills

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
AgC:							
Aguilares	90	Very limited		Not limited		Not limited	
		Depth to bedrock	1.00				
AlA:							
Alet	85	Somewhat limited		Somewhat limited		Not limited	
		Flooding	0.40	Flooding	0.40		
AnC:							
Annarose	80	Somewhat limited		Not limited		Somewhat limited	
		Too sandy	0.50			Too sandy	0.50
BdC:							
Benavides	90	Not limited		Not limited		Not limited	
BnC:							
Brennan	90	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
BrB:							
Brennan	90	Not limited		Not limited		Not limited	
BuA:							
Brundage	90	Very limited		Somewhat limited		Not limited	
		Excess salt	1.00	Flooding	0.40		
		Flooding	0.40				
CaA:							
Catarina	90	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
		Excess sodium	1.00			Hard to compact	1.00
						Sodium content	1.00
CmB:							
Colmena	85	Not limited		Not limited		Not limited	
CoC:							
Comitas	90	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
CpC:							
Copita	90	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
CyB:							
Coy	90	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
CZA:							
Czar	60	Somewhat limited		Somewhat limited		Not limited	
		Flooding	0.40	Flooding	0.40		

Table 20.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
Clareville----------	35	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Flooding	0.40	Too clayey	1.00
		Flooding	0.40				
DaB:							
Delfina-------------	90	Not limited		Not limited		Not limited	
DeA:							
Delfina-------------	95	Not limited		Not limited		Not limited	
DfB:							
Delmita-------------	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
DmB:							
Delmita-------------	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
DRB:							
Delmita-------------	60	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
Randado-------------	35	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
GeB:							
Gertrudis-----------	90	Somewhat limited		Not limited		Not limited	
		Too clayey	0.50				
GRD:							
Grava---------------	85	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Too clayey	1.00			Too clayey	1.00
						Gravel content	1.00
HeB:							
Hebbronville--------	90	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
HoB:							
Houla---------------	90	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
JdB:							
Jardin--------------	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
						Gravel content	1.00
						Carbonate content	1.00

Table 20.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
LoC:							
Lomart	85	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	0.50
McB:							
Maverick	80	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Hard to compact	1.00
						Depth to bedrock	1.00
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
						Gravel content	0.99
MoC:							
Moglia	85	Not limited		Not limited		Very limited	
						Hard to compact	1.00
MwA:							
Monwebb	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
		Excess sodium	1.00			Sodium content	1.00
NfC:							
Nueces	80	Not limited		Very limited		Not limited	
				Seepage	1.00		
NuC:							
Nusil	90	Not limited		Very limited		Not limited	
				Seepage	1.00		
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
						Gravel content	1.00
						Carbonate content	1.00
PgA:							
Papagua	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
PmC:							
Pernitas	90	Not limited		Not limited		Not limited	
PnB:							
Pernitas	85	Not limited		Not limited		Not limited	

Table 20.--Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
PRC:							
Piedras	60	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
Cuevitas	35	Very limited		Very limited		Very limited	
		Depth to thick cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
Ps:							
Pits, quarry	100	Not rated		Not rated		Not rated	
PtB:							
Premont	90	Not limited		Not limited		Not limited	
ReA:							
Realitos	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
SaC:							
Salco	90	Not limited		Not limited		Not limited	
SnC:							
Sarita	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Seepage	1.00	Too sandy	1.00
						Seepage	1.00
StA:							
Sinton	90	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
TaA:							
Tela	90	Somewhat limited		Somewhat limited		Not limited	
		Flooding	0.40	Flooding	0.40		
TcA:							
Tiocano	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
WaB:							
Weesatche	87	Not limited		Not limited		Not limited	
WaC:							
Weesatche	87	Not limited		Not limited		Not limited	
WeB:							
Weesatche	85	Not limited		Not limited		Not limited	

Table 21.--Source of Gravel and Sand

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
AgC:					
Aguilares	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AlA:					
Alet	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AnC:					
Annarose	80	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.07
BdC:					
Benavides	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BnC:					
Brennan	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BrB:					
Brennan	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BuA:					
Brundage	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CaA:					
Catarina	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CmB:					
Colmena	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CoC:					
Comitas	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.02
		Thickest layer	0.00	Thickest layer	0.07

Table 21.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
CpC:					
Copita	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CyB:					
Coy	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CZA:					
Czar	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Clareville	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
DaB:					
Delfina	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.08
DeA:					
Delfina	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
DfB:					
Delmita	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.07
DmB:					
Delmita	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
DRB:					
Delmita	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Randado	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
GeB:					
Gertrudis	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
GRD:					
Grava	85	Fair		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.37	Thickest layer	0.00

Table 21.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
HeB:					
Hebbronville	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
HoB:					
Houla	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
JdB:					
Jardin	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.01
LoC:					
Lomart	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
McB:					
Maverick	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MgD:					
Mirasol	85	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
MoC:					
Moglia	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MwA:					
Monwebb	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
NfC:					
Nueces	80	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.17
NuC:					
Nusil	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
OmD:					
Olmedo	90	Fair		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.57	Thickest layer	0.00

Table 21.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
PgA:					
Papagua	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PmC:					
Pernitas	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PnB:					
Pernitas	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PRC:					
Piedras	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Cuevitas	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Ps:					
Pits, quarry	100	Not rated		Not rated	
PtB:					
Premont	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ReA:					
Realitos	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
SaC:					
Salco	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
SnC:					
Sarita	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.33
StA:					
Sinton	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
TaA:					
Tela	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 21.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Potential source of gravel: Value	Potential source of sand: Rating class	Potential source of sand: Value
TcA:					
Tiocano-------------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
WaB:					
Weesatche-----------	87	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
WaC:					
Weesatche-----------	87	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
WeB:					
Weesatche-----------	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
AgC:							
Aguilares	90	Poor		Fair		Good	
		Too alkaline	0.00	Shrink-swell	0.87		
		Organic matter content low	0.60				
		Carbonate content	0.84				
		Salinity	0.88				
AlA:							
Alet	85	Good		Good		Good	
AnC:							
Annarose	80	Fair		Good		Fair	
		Organic matter content low	0.12			Carbonate content	0.63
		Carbonate content	0.46				
BdC:							
Benavides	90	Fair		Good		Fair	
		Carbonate content	0.32			Carbonate content	0.95
		Organic matter content low	0.82				
BnC:							
Brennan	90	Poor		Good		Good	
		Wind erosion	0.00				
		Organic matter content low	0.18				
		Carbonate content	0.99				
BrB:							
Brennan	90	Fair		Good		Good	
		Organic matter content low	0.60				
		Carbonate content	0.99				
BuA:							
Brundage	90	Poor		Fair		Poor	
		Salinity	0.00	Shrink-swell	0.87	Salinity	0.00
		Sodium content	0.00			Sodium content	0.00
		Organic matter content low	0.60				
		Water erosion	0.99				
CaA:							
Catarina	90	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Salinity	0.50			Salinity	0.00
		Droughty	0.99				

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
CmB:							
Colmena	85	Good		Fair		Good	
				Shrink-swell	0.87		
CoC:							
Comitas	90	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Too acid	0.61				
		Organic matter content low	0.88				
CpC:							
Copita	90	Poor		Poor		Fair	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.08
		Depth to bedrock	0.08	Low strength	0.22	Salinity	0.88
		Carbonate content	0.80			Sodium content	0.90
		Organic matter content low	0.88			Carbonate content	0.95
		Sodium content	0.90				
CyB:							
Coy	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
				Shrink-swell	0.12		
CZA:							
Czar	60	Good		Poor		Good	
				Low strength	0.00		
				Shrink-swell	0.49		
Clareville	35	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Carbonate content	0.16	Shrink-swell	0.21		
DaB:							
Delfina	90	Poor		Fair		Good	
		Wind erosion	0.00	Low strength	0.22		
		Organic matter content low	0.60	Shrink-swell	0.87		
DeA:							
Delfina	95	Fair		Fair		Good	
		Organic matter content low	0.60	Shrink-swell	0.93		
DfB:							
Delmita	90	Poor		Poor		Poor	
		Too sandy	0.00	Depth to cemented pan	0.00	Too sandy	0.00
		Wind erosion	0.00			Depth to cemented pan	0.03
		Droughty	0.00				
		Depth to cemented pan	0.03				
		Organic matter content low	0.88				

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
DmB:							
Delmita	90	Fair		Poor		Fair	
		Droughty	0.21	Depth to cemented pan	0.00	No cemented pan depth limitation	0.99
		Organic matter content low	0.88				
		No cemented pan depth limitation	0.99				
DRB:							
Delmita	60	Fair		Poor		Fair	
		Droughty	0.12	Depth to cemented pan	0.00	Depth to cemented pan	0.36
		Depth to cemented pan	0.36				
		Organic matter content low	0.88				
Randado	35	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Depth to cemented pan	0.00			Rock fragments	0.88
GeB:							
Gertrudis	90	Fair		Poor		Good	
		Organic matter content low	0.18	Low strength	0.00		
		Carbonate content	0.80	Shrink-swell	0.93		
GRD:							
Grava	85	Poor		Poor		Poor	
		Too clayey	0.00	Depth to cemented pan	0.00	Too clayey	0.00
		Droughty	0.00			Rock fragments	0.00
		Carbonate content	0.08			Depth to cemented pan	0.54
		Depth to cemented pan	0.54				
HeB:							
Hebbronville	90	Poor		Good		Good	
		Wind erosion	0.00				
		Organic matter content low	0.18				
HoB:							
Houla	90	Fair		Fair		Fair	
		Organic matter content low	0.08	Low strength	0.78	Too clayey	0.55
		Water erosion	0.68			Carbonate content	0.99
		Carbonate content	0.74				
		Too clayey	0.78				

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
JdB:							
Jardin	90	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Rock fragments	0.00
		Depth to cemented pan	0.00			Depth to cemented pan	0.00
		Carbonate content	0.00				
LoC:							
Lomart	85	Fair		Poor		Poor	
		Droughty	0.04	Depth to bedrock	0.00	Rock fragments	0.00
		Organic matter content low	0.08			Depth to bedrock	0.54
		Depth to bedrock	0.54			Sodium content	0.90
		Water erosion	0.68				
		Sodium content	0.90				
McB:							
Maverick	80	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Organic matter content low	0.05	Low strength	0.00	Sodium content	0.40
		Sodium content	0.40	Depth to bedrock	0.00	Depth to bedrock	0.54
		Depth to bedrock	0.54				
		Salinity	0.90				
MgD:							
Mirasol	85	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Depth to cemented pan	0.00			Rock fragments	0.00
		Organic matter content low	0.18				
MoC:							
Moglia	85	Poor		Poor		Poor	
		Sodium content	0.00	Low strength	0.00	Sodium content	0.00
		Too clayey	0.24	Shrink-swell	0.87	Too clayey	0.22
		Salinity	0.50			Salinity	0.88
MwA:							
Monwebb	90	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Carbonate content	0.88	Low strength	0.00	Carbonate content	0.99
NfC:							
Nueces	80	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Organic matter content low	0.18				
		Too acid	0.61				

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
NuC:							
Nusil	90	Poor		Fair		Fair	
		Wind erosion	0.00	Shrink-swell	0.99	Too sandy	0.41
		Too sandy	0.41				
		Organic matter content low	0.50				
OmD:							
Olmedo	90	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Carbonate content	0.00
		Carbonate content	0.00			Rock fragments	0.00
		Depth to cemented pan	0.00			Depth to cemented pan	0.00
PgA:							
Papagua	90	Fair		Poor		Poor	
		Too clayey	0.02	Wetness depth	0.00	Wetness depth	0.00
		Organic matter content low	0.88	Shrink-swell	0.17	Too clayey	0.01
				Low strength	0.78		
PmC:							
Pernitas	90	Fair		Poor		Fair	
		Carbonate content	0.32	Low strength	0.00		
		Organic matter content low	0.50	Shrink-swell	0.87		
PnB:							
Pernitas	85	Fair		Poor		Fair	
		Carbonate content	0.68	Low strength	0.00	Too clayey	0.69
		Too clayey	0.88	Shrink-swell	0.89		
PRC:							
Piedras	60	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Depth to cemented pan	0.00			Rock fragments	0.00
		Organic matter content low	0.88				
Cuevitas	35	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Depth to cemented pan	0.00				
Ps:							
Pits, quarry	100	Not rated		Not rated		Not rated	
PtB:							
Premont	90	Fair		Fair		Good	
		Organic matter content low	0.60	Low strength	0.22		
				Shrink-swell	0.87		

Table 22.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ReA:							
Realitos	90	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
				Low strength	0.00		
SaC:							
Salco	90	Fair		Fair		Fair	
		Carbonate content	0.92	Low strength	0.78	Sodium content	0.98
		Organic matter content low	0.96	Shrink-swell	0.87		
		Sodium content	0.97				
SnC:							
Sarita	90	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Organic matter content low	0.17				
StA:							
Sinton	90	Fair		Good		Fair	
		Carbonate content	0.97			Carbonate content	0.99
TaA:							
Tela	90	Fair		Good		Good	
		Organic matter content low	0.60				
		Carbonate content	0.99				
TcA:							
Tiocano	90	Poor		Poor		Poor	
		Too clayey	0.00	Wetness depth	0.00	Too clayey	0.00
		Sodium content	0.90	Shrink-swell	0.00	Wetness depth	0.00
				Low strength	0.00	Sodium content	0.90
WaB:							
Weesatche	87	Fair		Fair		Good	
		Organic matter content low	0.75	Shrink-swell	0.87		
		Carbonate content	0.92				
WaC:							
Weesatche	87	Fair		Fair		Good	
		Organic matter content low	0.75	Shrink-swell	0.87		
WeB:							
Weesatche	85	Good		Fair		Good	
				Shrink-swell	0.87		

Table 23.--Ponds and Embankments

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgC:							
Aguilares-----------	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.78	Depth to water	1.00
				Salinity	0.12		
AlA:							
Alet----------------	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.57	Piping	0.02	Depth to water	1.00
AnC:							
Annarose------------	80	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.08				
BdC:							
Benavides-----------	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.57			Depth to water	1.00
		Slope	0.08				
BnC:							
Brennan-------------	90	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
BrB:							
Brennan-------------	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
BuA:							
Brundage------------	90	Not limited		Very limited		Very limited	
				Piping	1.00	Depth to water	1.00
				Salinity	1.00		
CaA:							
Catarina------------	90	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
				Salinity	0.50		
CmB:							
Colmena-------------	85	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
CoC:							
Comitas-------------	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.90	Depth to water	1.00
CpC:							
Copita--------------	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.98	Depth to water	1.00
		Depth to bedrock	0.31	Piping	0.38		

Table 23.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
CyB:							
Coy	90	Not limited		Somewhat limited		Very limited	
				Piping	0.78	Depth to water	1.00
CZA:							
Czar	60	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
Clareville	35	Somewhat limited		Not limited		Very limited	
		Seepage	0.03			Depth to water	1.00
DaB:							
Delfina	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
DeA:							
Delfina	95	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
DfB:							
Delmita	90	Somewhat limited		Somewhat limited		Very limited	
		Depth to cemented pan	0.99	Thin layer	0.99	Depth to water	1.00
		Seepage	0.70	Seepage	0.88		
DmB:							
Delmita	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Seepage	1.00	Depth to water	1.00
		Depth to cemented pan	0.52	Thin layer	0.52		
DRB:							
Delmita	60	Somewhat limited		Somewhat limited		Very limited	
		Depth to cemented pan	0.91	Thin layer	0.91	Depth to water	1.00
		Seepage	0.70	Seepage	0.35		
Randado	35	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Thin layer	1.00	Depth to water	1.00
				Seepage	0.50		
GeB:							
Gertrudis	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	Depth to water	1.00
GRD:							
Grava	85	Somewhat limited		Very limited		Very limited	
		Depth to cemented pan	0.86	Seepage	1.00	Depth to water	1.00
		Slope	0.32	Thin layer	0.86		
		Seepage	0.05				
HeB:							
Hebbronville	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.31	Depth to water	1.00

Table 23.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
HoB:							
Houla	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
JdB:							
Jardin	90	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Seepage	1.00	Depth to water	1.00
				Thin layer	1.00		
LoC:							
Lomart	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.86	Depth to water	1.00
		Depth to bedrock	0.11	Piping	0.10		
McB:							
Maverick	80	Very limited		Very limited		Very limited	
		Gypsum content	1.00	Hard to pack	1.00	Depth to water	1.00
		Depth to bedrock	0.11	Salinity	0.10		
MgD:							
Mirasol	85	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.32	Thin layer	1.00		
MoC:							
Moglia	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	Depth to water	1.00
				Salinity	0.50		
MwA:							
Monwebb	90	Not limited		Very limited		Very limited	
				Hard to pack	1.00	Depth to water	1.00
NfC:							
Nueces	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.66	Depth to water	1.00
NuC:							
Nusil	90	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
OmD:							
Olmedo	90	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.32	Thin layer	1.00		
PgA:							
Papagua	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.02	Ponding	1.00	Cutbanks cave	0.10
				Depth to saturated zone	1.00		

Table 23.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
PmC:							
Pernitas------------	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.05	Depth to water	1.00
PnB:							
Pernitas------------	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.01	Depth to water	1.00
PRC:							
Piedras-------------	60	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Thin layer	1.00	Depth to water	1.00
Cuevitas------------	35	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Thin layer	1.00	Depth to water	1.00
				Seepage	0.50		
Ps:							
Pits, quarry--------	100	Not rated		Not rated		Not rated	
PtB:							
Premont-------------	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
ReA:							
Realitos------------	90	Not limited		Very limited		Very limited	
				Ponding	1.00	Depth to water	1.00
				Hard to pack	1.00		
SaC:							
Salco---------------	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	Depth to water	1.00
SnC:							
Sarita--------------	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.90	Depth to water	1.00
				Piping	0.22		
StA:							
Sinton--------------	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
TaA:							
Tela----------------	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.57	Depth to water	1.00
TcA:							
Tiocano-------------	90	Not limited		Very limited		Very limited	
				Ponding	1.00	Slow refill	1.00
				Depth to saturated zone	1.00	Cutbanks cave	0.10
				Hard to pack	1.00		

Table 23.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WaB:							
Weesatche-----------	87	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.53	Depth to water	1.00
WaC:							
Weesatche-----------	87	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.53	Depth to water	1.00
		Slope	0.08				
WeB:							
Weesatche-----------	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.36	Depth to water	1.00

Table 24.--Engineering Soil Properties

(Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
AgC:												
Aguilares-------	0-4	*Fine sandy loam	*SM-SC, SM	*A-2-4, A-4	0	0-2	75-100	75-100	50-95	25-50	16-25	7-18
	4-10	*Fine sandy loam, sandy clay loam	*SM-SC, SM	*A-2-4, A-4, A-6	0	0-2	75-100	75-100	50-95	35-80	16-25	7-28
	10-27	*Fine sandy loam, loam, sandy clay loam	*SM-SC, SC, CL	*A-4, A-2-4, A-6	0	0-2	75-100	75-100	50-95	35-80	25-39	7-24
	27-80	*Gravelly sandy clay loam, sandy clay loam, loam, sandy loam	*CL, SC, SM	*A-6, A-4	0	0-20	75-100	75-100	50-95	35-80	20-35	7-24
AlA:												
Alet------------	0-7	*Sandy clay loam	*SC,	*A-6	0	0	100	100	80-90	40-50	27-35	11-18
	7-46	*Sandy clay loam, clay loam	*SC, CL	*A-6	0	0	95-100	95-100	90-100	40-65	27-40	11-21
	46-80	*Sandy clay loam, clay loam	*SC, CL	*A-6	0	0	95-100	95-100	90-100	40-65	27-40	11-21
AnC:												
Annarose--------	0-9	*Fine sandy loam	*CL-ML, SC-SM, SC	*A-4, A-6	0	0	95-100	90-100	80-90	45-65	25-32	7-13
	9-25	*Sandy clay loam, fine sandy loam, loam	*CL-ML, SC, SM-SC	*A-6, A-4	0	0	95-100	90-100	80-95	45-60	25-35	7-15
	25-43	*Sandy clay loam, loam, fine sandy loam	*CL, SC	*A-6, A-4	0	0	95-100	90-100	80-95	45-60	30-40	9-18
	43-50	*Fine sandy loam, loamy fine sand	*SM-SC, SM	*A-4, A-2-4	0	0	95-100	90-100	65-80	25-50	21-30	5-11
	50-80	*Bedrock			---	---	---	---	---	---	---	---
BdC:												
Benavides-------	0-8	*Fine sandy loam	*SM-SC	*A-4	0	0	100	90-100	70-80	36-50	16-25	4-11
	8-26	*Sandy clay loam, loam	*CL, SC	*A-6	0	0	100	90-100	70-80	36-50	30-40	11-20
	26-50	*Clay loam, sandy clay loam	*CL, SC	*A-6	0	0	100	90-100	75-85	36-45	30-40	11-25
	50-80	*Sandy clay loam, loam, fine sandy loam	*CL, SC, SM-SC	*A-6, A-4	0	0	95-100	90-100	75-95	36-50	25-40	11-23

Table 24.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BnC:												
Brennan---------	0-5	*Loamy fine sand	*SM-SC, SM,	*A-2-4	0	0	95-100	95-100	85-100	15-25	16-30	NP-9
	5-15	*Fine sandy loam	*SM-SC	*A-2-4	0	0	98-100	98-100	70-100	20-35	20-35	8-10
	15-40	*Sandy clay loam	*CL, SC	*A-6	0	0	95-100	90-100	60-100	36-59	22-39	11-22
	40-49	*Fine sandy loam, sandy clay loam	*SM-SC, SC	*A-2-6, A-6, A-2-4	0	0	98-100	95-100	70-100	20-35	20-35	11-22
	49-80	*Fine sandy loam, sandy clay loam	*SM-SC, SC	*A-2-6, A-4, A-2-4	0	0	98-100	95-100	70-100	20-35	20-30	11-22
BrB:												
Brennan---------	0-12	*Fine sandy loam	*SM-SC, SC, SM	*A-2-4, A-4	0	0	100	98-100	70-100	20-35	16-30	5-15
	12-65	*Sandy clay loam	*CL, SC	*A-6, A-2-4, A-2-6, A-4	0	0	100	90-100	60-100	30-59	36-39	11-22
	65-80	*Fine sandy loam, sandy clay loam	*SM, SC, CL	*A-4, A-6, A-2-6, A-2-4	0	0	100	90-100	60-100	30-59	36-39	11-22
BuA:												
Brundage--------	0-3	*Fine sandy loam	*SM-SC	*A-4, A-2-4	0	0	100	95-100	65-100	36-60	16-25	3-8
	3-9	*Sandy clay loam, clay loam	*CL, SC	*A-6	0	0	95-100	95-100	80-100	36-55	25-35	11-20
	9-38	*Sandy clay loam, clay loam	*CL, SC	*A-6	0	0	95-100	95-100	90-100	40-65	30-40	11-27
	38-80	*Sandy clay loam, clay loam	*CL, SC	*A-6,	0	0	95-100	95-100	85-100	40-65	25-40	11-25
CaA:												
Catarina--------	0-3	*Clay, silty clay	*CH	*A-7-6	0	0-2	85-100	82-100	82-100	80-98	51-76	30-49
	3-73	*Clay, Silty clay	*CH	*A-7-6	0	0-2	85-100	82-100	82-100	80-98	51-76	30-49
	73-80	*Clay, Silty clay	*CH	*A-7-6	0	0-1	95-100	90-100	85-100	80-95	44-66	30-49
CmB:												
Colmena---------	0-11	*Fine sandy loam	*SM-SC, SM	*A-4, A-2	0	0	100	95-100	95-100	36-45	16-25	3-7
	11-39	*Sandy clay loam, fine sandy loam	*CL, SC, CM	*A-6, A-4	0	0	100	95-100	85-100	36-55	25-39	11-22
	39-80	*Sandy clay loam, Loam	*SC, CL	*A-6	0	0	95-100	90-100	70-100	36-50	30-39	16-31

Table 24.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
CoC:												
Comitas----------	0-31	*Loamy fine sand	*SM, SM-SC	*A-2-4	0	0	95-100	95-100	85-100	15-25	15-20	NP-4
	31-59	*Fine sandy loam	*SM-SC, SM	*A-4	0	0	95-100	95-100	85-100	15-25	15-20	5-10
	59-80	*Fine sandy loam, sandy clay loam	*SM, SC SM-SC	*A-4, A-6	0	0	95-100	95-100	80-100	36-50	15-35	5-35
CpC:												
Copita-----------	0-11	*Sandy clay loam	*SC, CL	*A-6	0	0	95-100	93-100	90-100	36-62	20-35	10-25
	11-37	*Sandy clay loam	*SC, CL	*A-6	0	0	95-100	93-100	90-100	40-82	25-35	11-28
	37-54	*Bedrock			---	---	---	---	---	---	---	---
CyB:												
Coy--------------	0-6	*Clay loam	*CL, CH	*A-6, A-7-6	0	0	98-100	97-100	95-100	70-85	35-40	18-30
	6-40	*Clay, clay loam, sandy clay	*CH, CL	*A-7-6, A-7-5	0	0	98-100	97-100	95-100	70-90	42-62	32-42
	40-80	*Clay, silty clay	*CH, CL	*A-7-6	0	0	98-100	97-100	95-100	70-90	41-60	30-40
CZA:												
Czar-------------	0-7	*Fine sandy loam	*SM-SC, SM	*A-4, A-2-4	0	0	100	95-100	95-100	45-70	15-25	5-10
	7-61	*Sandy clay loam, clay loam	*CL, SC	*A-6	0	0	100	95-100	90-100	51-80	20-35	17-25
	61-80	*Sandy clay loam	*CL, SC	*A-6	0	0	90-100	80-100	80-95	51-75	20-35	17-25
Clareville-------	0-5	*Loam	*CL, SC	*A-4, A-6	0	0	100	95-100	95-100	45-70	15-20	15-27
	5-33	*Clay loam, sandy clay loam, sandy clay, clay	*CL, CH	*A-6, A-7-6	0	0	100	95-100	90-100	51-80	46-60	25-37
	33-80	*Clay loam, sandy clay loam, clay loam, clay, loam	*CL, CH	*A-7-6, A-6	0	0	100	90-100	90-100	51-75	36-52	17-30
DaB:												
Delfina----------	0-15	*Loamy fine sand	*SM-SC, SM	*A-2-4	0	0	100	100	90-100	25-50	19-30	NP-7
	15-80	*Sandy clay loam, clay loam	*SC, CL	*A-6	0	0	100	95-100	90-100	38-55	30-39	18-35
DeA:												
Delfina----------	0-16	*Fine sandy loam	*SM-SC, SM	*A-4	0	0	100	100	90-100	25-50	15-30	5-15
	16-34	*Sandy clay loam, clay loam	*SC, CL	*A-6	0	0	100	95-100	90-100	38-55	31-39	18-35
	34-80	*Sandy clay loam, fine sandy loam	*SC, SM	*A-6, A-4	0	0	95-100	90-100	70-100	36-50	15-35	16-31

Table 24.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
DfB:												
Delmita---------	0-14	*Loamy fine sand	*SM-SC, SM	*A-2-4	0	0	100	95-100	90-100	20-35	16-27	NP-7
	14-30	*Sandy clay loam, fine sandy loam	*SC, SM	*A-6, A-4	0	0	100	100	90-100	30-50	27-39	8-18
	30-80	*Cemented material			---	---	---	---	---	---	---	---
DmB:												
Delmita---------	0-14	*Fine sandy loam	*SM-SC, SM	*A-2-4	0	0	100	100	90-100	20-35	16-27	3-10
	14-30	*Sandy clay loam, fine sandy loam	*SC, SM	*A-6, A-4	0	0	100	100	90-100	30-50	27-39	8-18
	30-80	*Cemented material			---	---	---	---	---	---	---	---
DRB:												
Delmita---------	0-11	*Fine sandy loam	*SM-SC, SM	*A-2-4, A-4	0	0	100	100	90-100	20-35	16-27	3-10
	11-28	*Sandy clay loam, Fine sandy loam	*SC, CL, SM	*A-6, A-2-6, A-4, A-2-4	0	0	100	100	90-100	30-50	25-39	8-18
	28-38	*Cemented material			---	---	---	---	---	---	---	---
	38-80	*Cemented material			---	---	---	---	---	---	---	---
Randado---------	0-8	*Fine sandy loam	*SM-SC, SM	*A-2-4, A-4	0	0-5	75-100	70-100	70-100	20-35	10-25	3-10
	8-16	*Fine sandy loam, Sandy clay loam	*SM-SC, SC	*A-2-6, A-2-4, A-4	0	0-5	65-100	60-100	60-100	25-50	25-34	7-14
	16-20	*Cemented material			---	---	---	---	---	---	---	---
	20-80	*Cemented material			---	---	---	---	---	---	---	---
GeB:												
Gertrudis-------	0-17	*Fine sandy loam	*SM-SC, SC	*A-4	0	0	100	95-100	90-100	36-50	10-30	4-11
	17-41	*Sandy clay loam, Clay loam	*CL, SC	*A-6	0	0	100	95-100	90-100	36-80	20-39	11-20
	41-80	*Clay loam, Sandy clay loam, Loam	*CL, SC	*A-6, A-4	0	0	90-100	80-100	75-99	44-80	25-39	11-23
GRD:												
Grava-----------	0-5	*Very gravelly sandy clay loam	*GC, SC	*A-2-6, A-2-4, A-6	0	0	26-75	26-75	21-67	11-40	25-35	8-15
	5-27	*Extremely gravelly clay	*GC	*A-7-5	0	0	12-50	12-50	10-50	8-46	41-55	20-30
	27-30	*Very gravelly clay loam	*GC, SC	*A-7-5	0-1	2-15	15-70	10-65	10-50	10-45	41-52	20-28
	30-39	*Cemented very gravelly material			---	---	---	---	---	---	---	---
	39-80	*Cemented very gravelly material			---	---	---	---	---	---	---	---

Table 24.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
HeB:												
Hebbronville----	0-5	*Fine sandy loam	*SM, SM-SC	*A-2-4, A-4	0	0	100	100	70-100	13-24	16-20	3-10
	5-21	*Fine sandy loam, loam	*SM-SC, SM	*A-4, A-2-4	0	0	100	100	80-100	20-45	16-30	3-10
	21-51	*Fine sandy loam, loam, sandy clay loam	*SM-SC, SC, SM	*A-2-4, A-4, A-6	0	0	100	100	80-100	20-45	16-30	3-15
	51-80	*Fine sandy loam	*SC, SM	*A-2-4, A-4	0	0	100	100	80-100	20-45	16-30	3-10
HoB:												
Houla-----------	0-7	*Clay loam	*CL, CH	*A-7-6, A-6	0	0	90-100	90-100	85-100	75-95	40-55	11-27
	7-16	*Silty clay, Clay loam	*CL, CH	*A-7-6	0	0	90-100	85-100	75-100	70-95	42-55	18-27
	16-32	*Silty clay loam, Clay loam	*CL, CH	*A-7-6, A-6	0	0	90-100	85-100	75-100	70-95	41-60	11-30
	32-51	*Loam, Sandy loam, sandy clay loam	*CL, SC	*A-4, A-6	0	0	95-100	90-100	75-100	55-82	25-39	11-16
	51-80	*Silt loam, Loam	*ML, CL	*A-4, A-6	0	0	95-100	90-100	85-100	55-82	15-35	4-10
JdB:												
Jardin----------	0-17	*Fine sandy loam	*SC, SM, SC-SM	*A-4, A-2-4	0-10	0-15	35-75	25-55	25-55	36-50	15-35	4-10
	17-22	*Cemented material			---	---	---	---	---	---	---	---
	22-80	*Cemented material			---	---	---	---	---	---	---	---
LoC:												
Lomart----------	0-6	*Loam	*ML-CL, ML	*A-4, A-5,	0	0	95-100	95-100	95-100	68-90	15-35	4-14
	6-10	*Paragravelly silt loam extremely paragravelly silt loam, very paragravelly loam, very paragravelly silt loam silt loam	*SC, SM	*A-4, A-2-4, A-2-6	0	0	80-95	55-85	45-60	30-45	15-35	7-23
	10-38	*Extremely paracobbly silt loam, Very paracobbly loam, very paracobbly fine sandy loam	*GM, GC, SC, SM	*A-4, A-2-4, A-2-6	0-5	0-10	65-95	50-90	35-85	26-50	15-35	7-23
	38-80	*Bedrock			---	---	---	---	---	---	---	---
McB:												
Maverick--------	0-5	*Clay	*CH	*A-7-6	0	0-3	98-100	95-100	80-100	75-90	51-75	30-50
	5-21	*Clay	*CH	*A-7-6	0	0-3	90-100	80-100	75-100	75-98	56-80	33-54
	21-26	*Clay	*CH	*A-7-6	0	0-3	90-100	80-100	75-100	75-98	56-80	33-54
	26-80	*Clay	*CH	*A-7-6	0	0-3	90-100	80-100	75-100	75-98	56-80	33-54

Table 24.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
MgD:												
Mirasol----------	0-6	*Very gravelly sandy loam	*GC, GM, ML, SM	*A-4, A-1-b, A-2-4	0	0-5	25-80	25-70	25-65	20-56	15-25	3-10
	6-16	*Very gravelly sandy loam, Very gravelly loam, very gravelly sandy clay loam	*GP-GC, GC, SC, SP-SC	*A-2-4, A-2-6	0	0-10	20-80	20-75	20-50	10-25	25-39	8-18
	16-80	*Cemented material			---	---	---	---	---	---	---	---
MoC:												
Moglia-----------	0-7	*Clay loam	*CL, SC	*A-6	0	0	90-100	90-100	75-100	55-85	28-39	12-31
	7-30	*Clay loam, clay	*CH, CL	*A-7-6	0	0	95-100	90-100	80-100	65-95	41-58	24-36
	30-42	*Loam, clay loam, clay	*SC, CH, CL	*A-6, A-7-6	0	0	95-100	90-100	80-100	65-95	25-58	24-36
	42-80	*Clay loam, clay	*CH, CL	*A-7-6	0	0	95-100	90-100	80-100	65-95	41-60	24-40
MwA:												
Monwebb----------	0-11	*Clay	*CH	*A-7-6	0	0	98-100	95-100	91-100	85-100	51-70	29-46
	11-46	*Clay, clay loam	*CH, CL	*A-7-6, A-6	0	0	98-100	95-100	91-100	85-100	35-70	29-46
	46-80	*Clay, clay loam	*CH, CL	*A-7-6, A-6	0	0	98-100	95-100	91-100	80-100	35-74	29-49
NfC:												
Nueces-----------	0-10	*Fine sand	*SP-SM, SM	*A-3, A-2-4	0	0	100	95-100	90-100	8-35	5-15	NP-6
	10-31	*Fine sand	*SP-SM, SM	*A-3, A-2-4	0	0	100	95-100	90-100	8-35	5-15	NP-6
	31-80	*Sandy clay loam	*CL, SC	*A-6	0	0	90-100	90-100	80-100	20-50	25-39	8-20
NuC:												
Nusil------------	0-15	*Loamy fine sand	*SP-SM, SM	*A-2-4	0	0	100	100	90-100	8-35	3-14	NP-3
	15-28	*Loamy fine sand, fine sand	*SP-SM, SM	*A-2-4	0	0	100	100	90-100	8-35	5-15	NP-3
	28-80	*Sandy clay loam, fine sandy loam	*SC, CL, SM	*A-6, A-4	0	0	100	100	80-90	35-55	15-35	8-15
OmD:												
Olmedo-----------	0-8	*Very gravelly fine sandy loam	*GC-GM, GC, SC, SM-SC	*A-2-4, A-4	0-10	0-30	30-75	25-55	20-55	10-35	8-30	4-10
	8-18	*Extremely gravelly sandy clay loam, extremely gravelly fine sandy loam	*GC, GC-GM, GP-GC	*A-2-6, A-2-4, A-4	0-10	0-30	25-75	20-55	15-55	10-35	18-39	11-18
	18-30	*Cemented material			---	---	---	---	---	---	---	---
	30-80	*Silt loam, paragravelly silt loam, very paragravelly silt loam	*ML, GM	*A-4	0-10	0-30	80-95	55-85	45-60	30-45	15-35	7-23

Table 24.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
PgA:												
Papagua---------	0-12	*Fine sandy loam	*SM-SC, SM	*A-2-4, A-4	0	0	95-100	95-100	90-100	25-50	16-25	4-10
	12-41	*Sandy clay, clay loam	*CH, CL	*A-7-6	0	0	95-100	95-100	85-95	35-60	25-45	11-30
	41-70	*Sandy clay loam, fine sandy loam	*SC, CL	*A-6, A-4	0	0	95-100	95-100	80-95	36-60	15-39	18-28
	70-80	*Sandy clay loam, fine sandy loam	*SC, CL	*A-6, A-4	0	0	95-100	95-100	80-95	36-60	15-39	18-28
PmC:												
Pernitas--------	0-7	*Fine sandy loam	*SM-SC, SC	*A-2-4, A-4	0	0	100	100	95-100	25-35	15-30	4-10
	7-35	*Sandy clay loam, clay loam	*SC, CL	*A-6, A-7-6	0	0	98-100	96-100	90-99	53-75	33-40	16-33
	35-58	*Sandy clay loam, clay loam	*CL, SC	*A-6, A-7-6	0	0	90-100	90-99	80-98	45-70	30-40	18-32
	58-80	*Loam, sandy clay loam	*ML, CL, SC	*A-4, A-6	0	0	75-100	70-99	60-98	40-67	15-39	15-25
PnB:												
Pernitas--------	0-12	*Sandy clay loam	*CL, SC	*A-6	0	0	100	100	95-100	36-55	24-37	9-20
	12-30	*Clay loam	*CL	*A-6	0	0	98-100	96-100	90-98	53-75	25-39	16-33
	30-80	*Sandy clay loam, clay loam	*CL, CH, SC	*A-6	0	0	90-100	90-99	80-99	45-70	25-39	18-32
PRC:												
Piedras---------	0-2	*Fine sandy loam	*SM-SC, SM	*A-2-4, A-4	0-10	0-30	80-100	55-100	48-100	23-58	10-25	3-10
	2-10	*Extremely cobbly fine sandy loam	*GC, SC, SC-SM	*A-2-4, A-2-6, A-4	0-10	0-30	74-100	43-100	37-100	15-52	10-34	3-14
	10-13	*Cemented material			---	---	---	---	---	---	---	---
	13-80	*Cemented material			---	---	---	---	---	---	---	---
Cuevitas--------	0-1	*Fine sandy loam	*SM-SC, SC, SM	*A-2-4	0	0-5	80-100	80-100	25-55	10-45	16-28	2-9
	1-9	*Fine sandy loam	*SC, SM-SC, SM	*A-2-4	0	0-5	80-100	80-100	25-55	10-45	16-28	3-9
	9-16	*Cemented material			---	---	---	---	---	---	---	---
	16-80	*Cemented material			---	---	---	---	---	---	---	---
Ps:												
Pits, quarry----	---	---	---	---	---	---	---	---	---	---	---	---

Table 24.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
PtB:												
Premont---------	0-8	*Fine sandy loam	*SM-SC, SC, SM	*A-4, A-2-4	0	0	100	100	90-100	25-50	19-30	3-10
	8-37	*Sandy clay loam, clay loam	*CL, SC	*A-6	0	0	100	95-100	90-100	38-55	25-39	18-35
	37-60	*Sandy clay loam, clay loam	*CL, CH, SC	*A-6	0	0	90-100	90-99	80-99	45-70	25-39	18-32
	60-80	*Sandy clay loam, fine sandy loam	*SC, SM	*A-6, A-4	0	0	95-100	90-100	70-100	36-50	15-35	16-31
ReA:												
Realitos--------	0-6	*Clay	*CH	*A-7-6	0	0	100	100	90-100	75-95	56-76	33-49
	6-49	*Clay	*CH	*A-7-6	0	0	100	100	90-100	75-95	56-76	33-49
	49-80	*Clay loam, sandy clay loam	*CL, SC	*A-6	0	0	100	100	90-100	75-95	25-39	16-33
SaC:												
Salco-----------	0-7	*Sandy clay loam	*CL	*A-6	0	0-3	85-100	80-100	60-85	51-80	27-35	11-17
	7-26	*Sandy clay loam	*CL	*A-6	0	0-3	80-100	80-100	65-90	40-70	30-39	11-22
	26-52	*Sandy clay loam	*CL	*A-6	0	0-3	80-100	80-100	65-90	40-70	30-39	11-22
	52-80	*Loam, fine sandy loam, sandy clay loam	*CL, SC	*A-4, A-6	0	0-3	85-99	80-95	58-90	35-65	25-35	8-15
SnC:												
Sarita----------	0-8	*Fine sand	*SP-SM	*A-3	0	0	100	100	65-100	5-10	10-20	NP-5
	8-48	*Fine sand	*SP-SM	*A-3	0	0	100	100	65-100	5-10	10-20	NP-5
	48-80	*Sandy clay loam, fine sandy loam	*CL, SC, SM	*A-6, A-4, A-2-4	0	0	100	100	80-100	17-50	20-39	5-22
StA:												
Sinton----------	0-34	*Sandy clay loam	*SC, CL	*A-6	0	0	100	96-100	50-100	20-52	15-35	11-23
	34-80	*Sandy clay loam	*CL, SC	*A-6	0	0	100	96-100	80-100	45-55	28-39	11-23
TaA:												
Tela------------	0-9	*Sandy clay loam	*SC, CL	*A-6	0	0	100	100	80-90	40-50	27-35	11-18
	9-32	*Sandy clay loam, clay loam	*CL, SC	*A-6	0	0	100	100	90-100	45-65	25-39	11-21
	32-80	*Sandy clay loam	*SC, CL	*A-6	0	0	95-100	95-100	90-100	40-65	25-39	11-21
TcA:												
Tiocano---------	0-10	*Clay	*CH	*A-7-6	0	0	100	100	95-100	85-100	56-76	33-49
	10-50	*Clay	*CH	*A-7-6	0	0	100	100	90-100	75-95	56-76	33-49
	50-80	*Clay, Clay loam, sandy clay, silty clay	*CH	*A-7-6	0	0	100	100	90-100	75-85	56-76	33-49

Table 24.--Engineering Soil Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
WaB:												
Weesatche-------	0-7	*Fine sandy loam	*SM-SC	*A-4, A-2-4	0	0	95-100	95-100	65-98	36-65	15-30	5-15
	7-29	*Sandy clay loam, clay loam	*CL, SC	*A-6	0	0	95-100	95-100	65-98	36-75	30-39	11-26
	29-40	*Sandy clay loam, fine sandy loam, loam	*CL, SC	*A-6, A-4	0	0	95-100	95-100	55-100	36-80	25-39	11-24
	40-80	*Sandy clay loam, fine sandy loam, loam	*SC, CL	*A-6, A-4	0	0	95-100	95-100	55-100	36-80	15-39	11-24
WaC:												
Weesatche-------	0-6	*Fine sandy loam	*SM-SC	*A-4, A-2-4	0	0	95-100	95-100	65-98	36-65	15-30	5-10
	6-35	*Sandy clay loam, clay loam	*CL, SC	*A-6	0	0	95-100	95-100	65-98	36-75	30-39	15-26
	35-80	*Sandy clay loam, fine sandy loam, loam	*CL, SC	*A-6, A-4	0	0	95-100	95-100	55-100	36-80	15-39	11-24
WeB:												
Weesatche-------	0-8	*Sandy clay loam	*CL, SC	*A-6	0	0	95-100	95-100	65-98	36-65	20-30	11-15
	8-30	*Sandy clay loam, clay loam	*CL, SC	*A-6	0	0	95-100	95-100	65-98	36-75	30-39	15-26
	30-80	*Sandy clay loam, fine sandy loam, loam	*CL, SC	*A-6, A-4	0	0	95-100	95-100	55-100	36-80	15-39	11-24

Table 25.--Physical Soil Properties

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K-sat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
AgC:												
Aguilares-----------	0-4	10-23	1.35-1.65	0.6-2	0.12-0.17	3.0-5.9	0.5-2.0	.32	.32	5	4L	86
	4-10	12-30	1.30-1.60	0.6-2	0.12-0.17	3.0-5.9	0.5-2.0	.32	.32			
	10-27	12-30	1.30-1.60	0.6-2	0.05-0.13	3.0-5.9	0.1-1.0	.32	.32			
	27-80	12-30	1.35-1.65	0.2-2	0.03-0.10	3.0-5.9	0.1-1.0	.32	.32			
AlA:												
Alet----------------	0-7	20-27	1.40-1.65	0.6-2	0.10-0.16	0.0-2.9	1.5-4.0	.32	.32	5	6	56
	7-46	25-35	1.45-1.70	0.6-2	0.14-0.20	0.0-2.9	1.0-3.0	.32	.32			
	46-80	20-35	1.45-1.70	0.6-2	0.10-0.15	0.0-2.9	0.5-1.0	.32	.32			
AnC:												
Annarose------------	0-9	12-18	1.30-1.50	2-6	0.10-0.17	0.0-2.9	0.5-2.0	.28	.28	5	3	86
	9-25	15-25	1.20-1.40	0.6-2	0.10-0.17	0.0-2.9	0.5-2.0	.32	.32			
	25-43	15-25	1.25-1.50	0.6-2	0.10-0.17	0.0-2.9	0.0-0.5	.32	.32			
	43-50	8-20	1.50-1.70	0.6-2	0.10-0.17	0.0-2.9	0.0-0.5	.28	.32			
	50-80	---	---	---	---	---	---	---	---			
BdC:												
Benavides-----------	0-8	10-20	1.40-1.70	0.6-2	0.11-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	8-26	15-30	1.40-1.70	0.6-2	0.11-0.15	0.0-2.9	0.8-1.5	.24	.24			
	26-50	20-35	1.25-1.50	0.6-2	0.12-0.17	0.0-2.9	0.5-1.0	.32	.32			
	50-80	15-30	1.25-1.50	0.6-2	0.12-0.19	0.0-2.9	0.1-0.5	.32	.32			
BnC:												
Brennan-------------	0-5	3-11	1.40-1.70	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	5-15	7-20	1.40-1.70	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.24	.24			
	15-40	18-30	1.25-1.65	0.6-2	0.12-0.17	0.0-2.9	0.1-0.5	.32	.32			
	40-49	15-28	1.25-1.65	2-6	0.11-0.15	0.0-2.9	0.1-0.5	.24	.24			
	49-80	14-28	1.25-1.65	2-6	0.11-0.15	0.0-2.9	0.1-0.5	.24	.24			
BrB:												
Brennan-------------	0-12	8-18	1.40-1.70	2-6	0.11-0.15	0.0-2.9	0.5-1.5	.28	.28	5	3	86
	12-65	20-30	1.25-1.65	0.6-2	0.12-0.17	0.0-2.9	0.1-1.0	.32	.32			
	65-80	20-30	1.25-1.65	0.6-2	0.12-0.17	0.0-2.9	0.1-0.9	.32	.32			

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K-sat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
BuA:												
Brundage------------	0-3	10-20	1.40-1.70	0.6-2	0.10-0.15	0.0-2.9	0.3-1.0	.32	.32	2	3	86
	3-9	22-35	1.45-1.75	0.00-0.06	0.05-0.14	3.0-5.9	0.3-1.0	.37	.37			
	9-38	22-35	1.45-1.70	0.06-0.2	0.03-0.14	3.0-5.9	0.1-1.0	.37	.37			
	38-80	20-32	1.35-1.65	0.06-0.2	0.02-0.10	3.0-5.9	0.1-1.0	.37	.37			
CaA:												
Catarina------------	0-3	35-60	1.20-1.40	0.00-0.06	0.06-0.18	9.0-25.0	1.0-2.0	.32	.32	4	4	86
	3-73	40-60	1.20-1.46	0.00-0.06	0.05-0.09	9.0-25.0	0.5-2.0	.32	.32			
	73-80	35-60	1.28-1.51	0.00-0.06	0.03-0.07	9.0-25.0	0.5-1.0	.32	.32			
CmB:												
Colmena-------------	0-11	12-24	1.30-1.55	2-6	0.11-0.16	0.0-2.9	1.0-6.0	.24	.24	5	3	86
	11-39	20-30	1.30-1.60	1-3	0.14-0.20	3.0-5.9	1.0-2.0	.24	.24			
	39-80	22-35	1.30-1.60	0.6-2	0.14-0.20	3.0-5.9	0.1-0.5	.32	.32			
CoC:												
Comitas-------------	0-31	2-12	1.50-1.70	2-6	0.05-0.10	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	31-59	2-12	1.35-1.65	2-6	0.12-0.17	0.0-2.9	0.1-0.5	.17	.17			
	59-80	8-30	1.45-1.70	2-6	0.11-0.17	0.0-2.9	0.5-1.0	.24	.24			
CpC:												
Copita--------------	0-11	14-25	1.35-1.60	2-6	0.10-0.15	0.0-2.9	0.5-1.0	.24	.24	3	5	56
	11-37	18-35	1.30-1.55	0.6-2	0.06-0.15	0.0-2.9	0.5-1.0	.24	.24			
	37-54	---	---	0.06-2	---	---	---	---	---			
CyB:												
Coy-----------------	0-6	27-45	1.35-1.55	0.2-0.6	0.15-0.20	3.0-5.9	1.0-3.0	.32	.32	5	4	86
	6-40	35-60	1.40-1.60	0.00-0.06	0.14-0.18	6.0-8.9	0.5-2.0	.32	.32			
	40-80	40-55	1.40-1.60	0.00-0.06	0.10-0.18	6.0-8.9	0.5-1.0	.32	.32			
CZA:												
Czar----------------	0-7	17-30	1.35-1.55	0.6-2	0.12-0.20	3.0-5.9	1.0-3.0	.32	.32	5	6	56
	7-61	25-35	1.40-1.60	0.6-2	0.15-0.20	6.0-8.9	0.5-2.0	.32	.32			
	61-80	25-35	1.40-1.60	0.6-2	0.12-0.16	3.0-5.9	0.5-1.5	.32	.32			
Clareville----------	0-5	25-35	1.35-1.55	0.6-2	0.12-0.20	3.0-5.9	1.0-3.0	.32	.32	5	6	56
	5-33	35-48	1.40-1.60	0.2-0.6	0.15-0.20	6.0-8.9	0.5-2.0	.32	.32			
	33-80	20-32	1.40-1.60	0.2-0.6	0.12-0.20	3.0-5.9	0.1-1.0	.32	.32			

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K-sat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
DaB:												
Delfina	0-15	3-15	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.1-1.0	.24	.24	5	2	134
	15-80	19-35	1.45-1.70	0.6-2	0.10-0.17	3.0-5.9	0.1-1.0	.32	.32			
DeA:												
Delfina	0-16	7-20	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.1-1.0	.24	.24	5	3	86
	16-34	25-35	1.45-1.70	0.6-2	0.10-0.20	3.0-5.9	0.1-1.0	.32	.32			
	34-80	19-35	1.45-1.70	0.6-2	0.10-0.17	3.0-5.9	0.1-1.0	.32	.32			
DfB:												
Delmita	0-14	7-10	1.45-1.70	0.6-2	0.07-0.11	0.0-2.9	0.5-1.0	.17	.17	3	2	134
	14-30	14-35	1.45-1.70	0.6-2	0.12-0.15	0.0-2.9	0.2-0.8	.28	.28			
	30-80	---	---	0.00-0.06	---	---	---	.10	.10			
DmB:												
Delmita	0-14	10-21	1.40-1.70	0.6-2	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	14-30	18-30	1.45-1.70	0.6-2	0.12-0.15	0.0-2.9	0.5-1.0	.28	.28			
	30-80	---	---	0.00-0.06	---	---	---	.10	.10			
DRB:												
Delmita	0-11	10-21	1.40-1.70	0.6-2	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	3	3	86
	11-28	18-30	1.45-1.70	0.6-2	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	28-38	---	---	0.00-0.06	---	---	---	---	---			
	38-80	---	---	0.00-0.2	---	---	---	---	---			
Randado	0-8	8-18	1.40-1.70	0.6-2	0.10-0.14	0.0-2.9	1.0-2.0	.24	.24	2	3	86
	8-16	15-25	1.45-1.75	0.6-2	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	16-20	---	---	0.00-0.06	---	---	---	---	---			
	20-80	---	---	0.00-0.2	---	---	---	---	---			
GeB:												
Gertrudis	0-17	15-20	1.40-1.70	0.6-2	0.11-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	17-41	23-31	1.20-1.45	0.6-2	0.12-0.17	3.0-5.9	0.5-1.0	.32	.32			
	41-80	23-35	1.25-1.45	0.6-2	0.12-0.20	3.0-5.9	0.1-0.5	.32	.32			
GRD:												
Grava	0-5	20-30	1.35-1.55	0.6-2	0.08-0.15	0.0-2.9	1.5-4.5	.15	.32	2	8	0
	5-27	40-60	1.35-1.60	0.2-0.6	0.02-0.13	0.0-2.9	1.0-2.5	.10	.32			
	27-30	27-45	1.35-1.60	0.2-0.6	0.05-0.14	0.0-2.0	0.5-1.2	.10	.32			
	30-39	---	---	0.00-0.01	---	---	---	---	---			
	39-80	---	---	0.03-0.3	---	---	---	---	---			

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K-sat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
HeB:												
Hebbronville--------	0-5	8-15	1.45-1.70	2-6	0.07-0.12	0.0-2.9	0.5-1.0	.20	.20	5	2	86
	5-21	11-18	1.40-1.55	2-6	0.11-0.17	0.0-2.9	0.1-0.5	.24	.24			
	21-51	11-22	1.40-1.55	2-6	0.11-0.17	0.0-2.9	0.1-0.5	.24	.24			
	51-80	11-18	1.40-1.55	2-6	0.11-0.17	0.0-2.9	0.1-0.5	.24	.24			
HoB:												
Houla---------------	0-7	25-42	1.35-1.55	0.6-2	0.15-0.20	3.0-5.9	1.0-3.0	.28	.28	5	4L	86
	7-16	25-43	1.40-1.60	0.6-2	0.15-0.20	3.0-5.9	1.0-3.0	.28	.28			
	16-32	20-38	1.40-1.60	0.6-2	0.15-0.20	3.0-5.9	0.4-1.0	.32	.32			
	32-51	12-30	1.35-1.55	2-6	0.10-0.16	0.0-2.9	0.1-0.3	.49	.49			
	51-80	9-20	1.35-1.55	2-6	0.10-0.16	0.0-2.9	0.1-0.3	.49	.49			
JdB:												
Jardin--------------	0-17	12-20	1.28-1.55	0.6-2	0.05-0.10	0.0-2.0	0.8-1.2	.24	.24	2	3	86
	17-22	---	---	0.00-0.2	---	---	---	---	---			
	22-80	---	---	0.00-0.2	---	---	---	---	---			
LoC:												
Lomart--------------	0-6	12-20	1.35-1.55	0.6-2	0.15-0.24	0.0-2.9	0.4-1.0	.49	.49	3	4L	86
	6-10	8-16	1.40-1.65	2-6	0.05-0.15	0.0-2.9	0.2-0.6	.32	.37			
	10-38	9-17	1.40-1.65	2-6	0.05-0.15	0.0-2.9	0.1-0.3	.24	.37			
	38-80	---	---	0.2-2	---	---	---	---	---			
McB:												
Maverick------------	0-5	40-60	1.05-1.35	0.00-0.06	0.12-0.20	9.0-25.0	1.0-4.0	.32	.32	3	4	86
	5-21	55-65	1.10-1.45	0.00-0.06	0.12-0.20	9.0-25.0	1.0-4.0	.32	.32			
	21-26	55-75	1.05-1.45	0.00-0.06	0.12-0.20	9.0-25.0	0.5-2.0	.32	.32			
	26-80	55-80	1.00-1.35	0.00-0.06	0.05-0.17	9.0-25.0	0.1-0.5	.32	.32			
MgD:												
Mirasol-------------	0-6	10-20	1.50-1.65	0.6-2	0.06-0.14	0.0-2.9	0.5-1.0	.15	.28	2	8	0
	6-16	10-25	1.50-1.65	0.6-2	0.07-0.12	0.0-2.9	0.1-0.5	.10	.28			
	16-80	---	---	0.00-0.06	---	---	---	---	---			
MoC:												
Moglia--------------	0-7	27-40	1.35-1.60	0.6-2	0.12-0.15	3.0-5.9	1.0-3.0	.32	.32	5	4L	56
	7-30	30-43	1.28-1.50	0.2-0.6	0.08-0.16	3.0-5.9	0.5-3.0	.32	.32			
	30-42	30-43	1.28-1.50	0.2-0.6	0.02-0.10	3.0-5.9	0.5-2.0	.32	.32			
	42-80	15-30	1.35-1.65	0.6-2	0.07-0.16	3.0-5.9	0.5-1.0	.32	.32			

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K-sat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
MwA:												
Monwebb--------------	0-11	39-55	1.30-1.45	0.00-0.06	0.12-0.19	9.0-25.0	1.0-4.0	.32	.32	5	4	86
	11-46	40-60	1.30-1.45	0.00-0.06	0.11-0.18	9.0-25.0	1.0-2.0	.32	.32			
	46-80	40-60	1.30-1.45	0.00-0.06	0.09-0.15	9.0-25.0	0.1-0.5	.32	.32			
NfC:												
Nueces---------------	0-10	2-12	1.50-1.70	2-6	0.05-0.10	0.0-2.9	0.5-2.0	.17	.17	5	1	250
	10-31	2-12	1.35-1.65	2-6	0.12-0.17	0.0-2.9	0.1-0.5	.17	.17			
	31-80	20-35	1.45-1.65	0.2-0.6	---	0.0-2.9	0.1-0.5	.24	.24			
NuC:												
Nusil----------------	0-10	1-10	1.45-1.75	2-6	0.05-0.10	0.0-2.9	0.5-1.0	.17	.17	5	1	134
	10-36	1-13	1.35-1.65	2-6	0.05-0.10	0.0-2.9	0.1-1.0	.17	.17			
	36-72	18-35	1.65-1.75	0.2-0.6	0.12-0.17	3.0-5.9	0.1-1.0	.24	.24			
	72-80	18-35	1.65-1.75	0.2-0.6	0.12-0.17	3.0-5.9	0.1-1.0	.24	.24			
OmD:												
Olmedo---------------	0-8	12-21	1.25-1.55	0.6-2	0.05-0.10	0.0-2.9	1.0-5.0	.10	.32	1	8	0
	8-18	12-21	1.30-1.55	0.6-2	0.05-0.10	0.0-2.9	1.0-3.0	.10	.32			
	18-30	---	---	0.00-0.06	---	---	---	---	---			
	30-80	10-25	1.20-1.55	0.6-2	0.05-0.10	0.0-2.9	0.5-1.0	.10	.32			
PgA:												
Papagua--------------	0-12	5-18	1.40-1.60	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.28	.28	5	3	86
	12-41	35-50	1.40-1.60	0.06-0.2	0.14-0.18	6.0-8.9	0.5-1.0	.32	.32			
	41-70	19-38	1.45-1.65	0.06-0.6	0.12-0.18	6.0-8.9	0.1-1.0	.37	.37			
	70-80	19-38	1.45-1.65	0.06-0.6	0.12-0.18	6.0-8.9	0.1-1.0	.37	.37			
PmC:												
Pernitas-------------	0-7	15-20	1.35-1.60	2-6	0.11-0.16	0.0-2.9	1.0-3.0	.28	.28	5	3	86
	7-35	21-35	1.30-1.55	0.6-2	0.13-0.18	3.0-5.9	0.1-2.0	.32	.32			
	35-58	22-40	1.35-1.60	0.6-2	0.13-0.19	3.0-5.9	0.1-2.0	.32	.32			
	58-80	18-30	1.35-1.60	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.32	.32			
PnB:												
Pernitas-------------	0-12	20-32	1.35-1.60	0.6-2	0.11-0.16	0.0-2.9	1.0-3.0	.32	.32	5	5	56
	12-30	21-35	1.30-1.55	0.6-2	0.13-0.18	3.0-5.9	0.1-2.0	.32	.32			
	30-80	25-40	1.35-1.60	0.6-2	0.13-0.19	3.0-5.9	0.1-2.0	.28	.32			

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (K-sat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
PRC:												
Piedras	0-2	6-22	1.40-1.60	0.6-2	0.10-0.14	0.0-2.9	1.0-2.0	.10	.24	2	3	0
	2-10	6-22	1.45-1.75	0.6-2	0.12-0.16	0.0-2.9	0.5-1.0	.10	.28			
	10-13	---	---	0.00-0.2	---	---	---	---	---			
	23-80	---	---	0.00-0.2	---	---	---	---	---			
Cuevitas	0-1	6-22	1.50-1.70	0.6-2	0.10-0.14	0.0-2.9	0.5-2.0	.20	.24	2	3	86
	1-9	6-25	1.50-1.70	0.6-2	0.10-0.14	0.0-2.9	0.5-2.0	.20	.24			
	9-16	---	---	0.00-0.06	---	---	---	---	---			
	16-80	---	---	0.00-0.2	---	---	---	---	---			
Ps:												
Pits, quarry	---	---	---	---	---	---	---	---	---	--	---	---
PtB:												
Premont	0-8	7-20	1.50-1.70	2-6	0.11-0.15	0.0-2.9	0.1-1.0	.24	.24	5	3	86
	8-37	25-35	1.45-1.70	0.6-2	0.10-0.20	3.0-5.9	0.1-1.0	.32	.32			
	37-60	25-40	1.35-1.60	0.6-2	0.13-0.19	3.0-5.9	0.1-2.0	.28	.32			
	60-80	25-40	1.35-1.60	0.6-2	0.13-0.19	3.0-5.9	0.1-2.0	.28	.32			
ReA:												
Realitos	0-6	35-60	1.35-1.60	0.00-0.06	0.12-0.18	9.0-25.0	1.0-4.0	.32	.32	5	4	86
	6-49	40-60	1.35-1.60	0.00-0.06	0.12-0.18	9.0-25.0	1.0-3.0	.32	.32			
	49-80	32-50	1.25-1.50	0.00-0.06	0.12-0.17	9.0-25.0	0.5-2.0	.28	.28			
SaC:												
Salco	0-7	20-27	1.45-1.60	0.6-2	0.12-0.17	3.0-5.9	1.0-3.0	.24	.28	5	4L	56
	7-26	24-35	1.25-1.50	0.6-2	0.12-0.17	3.0-5.9	0.5-1.2	.32	.32			
	26-52	24-35	1.25-1.50	0.6-2	0.12-0.17	3.0-5.9	0.3-1.0	.32	.32			
	52-80	17-23	1.35-1.55	0.6-2	0.15-0.20	3.0-5.9	0.1-0.5	.32	.32			
SnC:												
Sarita	0-8	2-13	1.40-1.70	6-20	0.05-0.08	0.0-2.9	0.1-1.0	.17	.17	5	1	250
	8-48	2-13	1.40-1.70	6-20	0.05-0.08	0.0-2.9	0.1-1.0	.17	.17			
	48-80	18-35	1.35-1.70	0.6-2	0.13-0.19	3.0-5.9	0.1-1.0	.24	.24			
StA:												
Sinton	0-34	10-35	1.40-1.60	2-6	0.07-0.15	0.0-2.9	0.5-2.0	.28	.28	5	5	56
	34-80	20-35	1.35-1.60	0.6-2	0.15-0.20	0.0-2.9	1.0-3.0	.28	.28			

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (K-sat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
TaA:												
Tela------------------	0-9	16-28	1.40-1.65	0.6-2	0.10-0.16	0.0-2.9	1.0-4.0	.28	.28	5	6	56
	9-32	18-35	1.45-1.70	0.6-2	0.14-0.20	0.0-2.9	0.5-4.0	.32	.32			
	32-80	16-30	1.45-1.70	0.6-2	0.14-0.20	0.0-2.9	0.1-1.0	.32	.32			
TcA:												
Tiocano---------------	0-10	40-60	1.35-1.60	0.00-0.06	0.12-0.18	9.0-25.0	1.0-4.0	.32	.32	5	4	86
	10-50	40-60	1.35-1.60	0.00-0.06	0.12-0.18	9.0-25.0	0.5-2.0	.32	.32			
	50-80	28-44	1.25-1.50	0.00-0.06	0.12-0.17	9.0-25.0	0.1-0.7	.32	.32			
WaB:												
Weesatche-------------	0-7	10-25	1.35-1.55	0.6-2	0.11-0.15	0.0-2.9	1.0-4.0	.32	.32	5	3	86
	7-29	18-35	1.30-1.50	0.6-2	0.15-0.20	3.0-5.9	0.5-4.0	.32	.32			
	29-40	18-35	1.30-1.55	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.32	.32			
	40-80	15-30	1.30-1.55	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.32	.32			
WaC:												
Weesatche-------------	0-6	10-25	1.35-1.55	0.6-2	0.11-0.15	0.0-2.9	1.0-4.0	.32	.32	5	5	86
	6-35	18-35	1.30-1.50	0.6-2	0.15-0.20	3.0-5.9	0.5-4.0	.32	.32			
	35-80	18-35	1.30-1.55	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.32	.32			
WeB:												
Weesatche-------------	0-8	20-30	1.35-1.55	0.6-2	0.11-0.15	0.0-2.9	1.0-4.0	.32	.32	5	5	56
	8-30	20-35	1.30-1.50	0.6-2	0.15-0.20	3.0-5.9	0.5-4.0	.32	.32			
	30-80	18-35	1.30-1.55	0.6-2	0.10-0.15	3.0-5.9	0.1-1.0	.32	.32			

Table 26.--Chemical Soil Properties

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
AgC:							
Aguilares------------	0-4	6.0-15	7.9-8.8	0-20	0	0.0-2.0	0
	4-10	6.0-15	7.9-8.8	5-35	0	0.0-2.0	0
	10-27	8.0-18	7.9-8.8	10-35	0-4	2.0-16.0	0
	27-80	8.0-18	7.9-8.8	10-40	0.4	2.0-16.0	0-1
AlA:							
Alet-----------------	0-7	15-30	6.6-8.4	0-5	0-1	0.0-4.0	0-2
	7-46	15-30	7.4-8.4	0-5	0-1	0.0-4.0	0-4
	46-80	10-30	7.4-8.4	5-15	0-1	2.0-8.0	2-10
AnC:							
Annarose-------------	0-9	10-20	7.4-8.4	10-25	0	0	0
	9-25	10-20	7.6-8.4	20-35	0	0	0
	25-43	10-20	7.8-8.4	20-35	0	0	0
	43-50	5.0-15	7.9-8.4	15-30	0	0	0
	50-80	---	---	---	---	---	---
BdC:							
Benavides------------	0-6	7.0-10	7.6-8.4	1-10	0	0	0
	6-15	7.0-10	7.6-8.4	6-20	0	0	0
	15-52	15-25	7.8-8.5	10-50	0	0.0-2.0	0
	52-80	7.0-15	7.9-8.4	15-40	0	0.0-4.0	0-2
BnC:							
Brennan--------------	0-5	7.0-15	6.6-7.8	0	0	0.0-2.0	0
	5-15	10-20	6.6-7.8	0	0	0.0-2.0	0
	15-40	15-25	6.6-7.8	2-30	0-2	0.0-4.0	0
	40-49	10-17	7.4-8.4	2-30	0-2	0.0-4.0	0
	49-80	7.0-15	7.4-8.4	2-30	0-2	0.0-4.0	0
BrB:							
Brennan--------------	0-12	10-20	6.6-7.8	0	0	0.0-2.0	0
	12-65	15-25	7.4-8.4	2-30	0-2	0.0-4.0	0
	65-80	10-20	7.4-8.4	2-30	0-2	0.0-4.0	0
BuA:							
Brundage-------------	0-3	3.0-10	5.6-7.3	0	0	0.0-4.0	0-8
	3-9	11-22	5.6-7.8	0-5	0	4.0-16.0	0-45
	9-38	11-22	7.4-8.4	3-10	0-5	8.0-32.0	0-45
	38-80	10-18	7.9-8.4	3-20	0-10	8.0-32.0	10-45
CaA:							
Catarina-------------	0-3	22-40	7.4-8.4	2-15	0-5	0.0-8.0	0-30
	3-73	22-40	7.4-8.4	2-20	0-15	4.0-16.0	13-35
	73-80	22-40	7.4-8.4	2-20	0-15	8.0-16.0	13-35
CmB:							
Colmena--------------	0-11	5.0-15	6.1-7.8	0	0	0.0-2.0	0
	11-39	15-25	7.4-8.4	3-20	0	0.0-5.0	0
	39-80	10-15	7.4-8.4	5-15	0	0.0-4.0	0
CoC:							
Comitas--------------	0-31	1.0-5.0	6.1-7.3	0	0	0.0-2.0	0
	31-59	8-15	5.4-7.3	0-2	0-2	0.0-2.0	0-2
	59-80	8-15	6.1-8.4	0-5	0	0.0-2.0	0

Table 26.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
CpC:							
Copita----------------	0-11	7.5-13	7.9-8.4	1-10	0	0.0-4.0	0
	11-37	9.6-19	7.9-8.4	10-35	0-2	2.0-8.0	0-12
	37-54	---	---	---	---	---	---
CyB:							
Coy-------------------	0-6	25-45	7.9-8.4	0	0	0.0-2.0	0-5
	6-40	25-45	7.9-8.4	0-10	0-5	0.0-2.0	2-5
	40-80	20-35	7.9-8.4	2-20	0-10	2.0-8.0	4-15
CZA:							
Czar------------------	0-7	20-35	6.6-7.8	0-5	0	0.0-1.0	0
	7-61	30-50	7.9-8.4	5-15	0	0.0-1.0	0-2
	61-80	10-20	7.9-8.4	5-20	0-1	0.0-1.0	0-5
Clareville------------	0-5	20-35	6.6-7.8	0	0	0	0
	5-33	30-50	7.9-8.4	0-10	0	0	0
	33-80	10-20	7.9-8.4	15-40	0	0.0-4.0	0-2
DaB:							
Delfina---------------	0-15	2.0-10	6.1-7.8	0	0	0.0-2.0	0-3
	15-80	10-15	6.6-8.4	0-5	0	0.0-4.0	0-3
DeA:							
Delfina---------------	0-16	2.0-10	6.1-7.8	0	0	0.0-2.0	0
	16-34	10-20	6.6-8.4	0-5	0	0.0-4.0	0
	34-80	10-20	7.4-8.4	5-15	0	0.0-4.0	0
DfB:							
Delmita---------------	0-14	2.0-10	6.0-7.7	0-2	0	0	0
	14-30	7.0-17	6.0-7.0	0-10	0	0	0
	30-80	---	---	---	---	---	---
DmB:							
Delmita---------------	0-14	2.0-10	6.6-7.8	0-2	0	0	0
	14-30	7.0-17	7.0-7.9	0-10	0	0	0
	30-80	---	---	---	---	---	---
DRB:							
Delmita---------------	0-11	2.0-10	6.6-7.8	0-2	0	0	0
	11-28	7.0-17	6.6-7.8	0-10	0	0	0
	28-38	---	---	---	---	---	---
	38-80	---	---	---	---	---	---
Randado---------------	0-8	2.0-9.0	6.6-7.8	0	0	0	0
	8-16	4.0-14	6.6-7.8	0-5	0	0	0
	16-20	---	---	---	---	---	---
	20-80	---	---	---	---	---	---
GeB:							
Gertrudis-------------	0-17	7.0-10	7.9-8.4	2-5	0	0.0-4.0	0-8
	17-41	10-15	7.9-8.4	4-15	0	0.0-4.0	0-8
	41-80	10-15	7.9-8.4	10-35	0	0.0-4.0	0-8
GRD:							
Grava-----------------	0-5	10-30	6.6-7.8	0-2	0-1	0.0-2.0	0-1
	5-27	25-45	6.1-7.3	0-2	0-1	0.0-2.0	0-2
	27-30	15-30	7.4-8.4	30-55	0-1	0.0-2.0	1-3
	30-39	---	---	---	---	---	---
	39-80	---	---	---	---	---	---

Table 26.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
HeB:							
Hebbronville---------	0-5	1.0-5.0	6.6-7.8	0	0	0.0-2.0	0-4
	5-21	2.0-10	6.6-8.4	1-5	0	0.0-2.0	0-4
	21-51	2.0-10	7.9-8.4	1-5	0	0.0-2.0	0-4
	51-80	2.0-10	7.9-8.4	1-5	0	0.0-2.0	0-4
HoB:							
Houla----------------	0-7	25-35	7.4-8.4	2-5	0	0.0-2.0	0-5
	7-16	25-38	7.4-8.4	5-20	0	0.0-2.0	0-5
	16-32	28-39	7.4-8.4	5-20	0	0.0-2.0	0-5
	32-51	6.0-39	7.4-8.4	10-25	0-2	1.0-3.0	1-5
	51-80	5.0-39	7.4-8.4	10-25	0-2	2.0-10.0	2-12
JdB:							
Jardin---------------	0-17	5.0-20	7.4-8.4	35-55	0	0	0
	17-22	---	---	---	---	---	---
	22-80	---	---	---	---	---	---
LoC:							
Lomart---------------	0-6	6.0-10	7.4-8.4	5-10	0	0.0-2.0	0-5
	6-10	4.0-10	7.4-8.4	5-15	0	0.0-2.0	0-5
	10-38	4.0-10	7.4-8.4	5-15	0	0.0-4.0	2-10
	38-80	---	---	---	---	---	---
McB:							
Maverick-------------	0-5	30-50	6.6-8.4	2-15	0	0.0-4.0	0-5
	5-21	30-60	6.6-8.4	2-15	0-10	2.0-8.0	2-12
	21-26	30-50	6.6-8.4	2-15	5-20	4.0-16.0	13-30
	26-80	30-50	6.6-8.4	2-15	5-20	4.0-16.0	13-30
MgD:							
Mirasol--------------	0-6	4.0-12	7.9-8.4	5-8	0	0.0-2.0	0
	6-16	4.0-14	7.9-8.4	5-8	0	0.0-2.0	0
	16-80	---	---	---	---	---	---
MoC:							
Moglia---------------	0-7	8.0-20	7.4-8.4	2-10	0	0.0-2.0	0-5
	7-30	9.0-22	7.4-8.4	5-25	0-1	2.0-8.0	5-35
	30-42	9.0-22	7.4-8.4	5-25	0-1	4.0-8.0	5-35
	42-80	4.0-25	7.4-8.4	2-25	1-20	8.0-16.0	13-40
MwA:							
Monwebb--------------	0-11	16-39	7.4-8.4	5-25	0	0.0-4.0	0-5
	11-46	16-39	7.4-8.4	5-35	0	0.0-4.0	5-18
	46-80	16-39	7.4-8.4	2-40	1-10	2.0-8.0	0-40
NfC:							
Nueces---------------	0-10	2.0-10	5.6-7.5	0	0	0.0-2.0	0
	10-31	2.0-10	5.4-7.3	0-2	0-2	0.0-2.0	0-2
	31-80	1.2-30	6.0-8.4	0-5	0-2	0.0-5.0	0-5
NuC:							
Nusil----------------	0-15	1.0-5.0	6.1-7.8	0	0	0	0
	15-28	1.0-5.0	6.1-7.8	0	0	0	0
	28-62	10-25	6.1-7.8	0-5	0	0.0-2.0	0-4
	62-80	10-25	6.1-7.8	0-7	0	0.0-2.0	0-4

Table 26.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
OmD:							
Olmedo----------------	0-8	5.0-20	7.4-8.4	40-70	0	0.0-2.0	0
	8-18	5.0-20	7.4-8.4	40-70	0	0.0-2.0	0
	18-30	---	---	---	---	---	---
	30-80	---	---	---	---	---	---
PgA:							
Papagua---------------	0-12	2.0-9.0	6.1-7.3	0	0	0.0-2.0	0-5
	12-41	14-25	7.4-8.4	0	0	0.0-2.0	0-5
	41-70	12-20	7.4-8.4	0-15	0	0.0-2.0	0-5
	70-80	12-20	7.4-8.4	0-15	0	0.0-2.0	0-5
PmC:							
Pernitas--------------	0-7	10-20	7.4-8.4	5-10	0	0.0-2.0	0
	7-35	15-30	7.4-8.4	8-17	0	0.0-2.0	0
	35-58	10-30	7.4-8.4	10-20	0	0.0-2.0	0
	58-80	10-30	7.9-8.4	15-40	0-1	0.0-2.0	0-1
PnB:							
Pernitas--------------	0-12	10-25	7.4-8.4	3-10	0	0.0-2.0	0
	12-30	15-30	7.4-8.4	8-17	0	0.0-2.0	0
	30-80	20-30	7.4-8.4	10-20	0	0.0-2.0	0
PRC:							
Piedras---------------	0-2	2.0-9.0	6.6-7.8	0-2	0	0.0-2.0	0
	2-10	2.0-9.0	6.6-7.8	0-20	0	0.0-2.0	0
	10-13	---	---	---	---	---	---
	13-80	---	---	---	---	---	---
Cuevitas--------------	0-1	3.0-10	6.6-7.8	0	0	0.0-2.0	0
	1-9	5.0-12	6.6-7.8	0	0	0.0-2.0	0
	9-16	---	---	---	---	---	---
	16-80	---	---	---	---	---	---
Ps:							
Pits, quarry----------	---	---	---	---	---	---	---
PtB:							
Premont---------------	0-8	2.0-10	6.1-7.8	0	0	0.0-2.0	0
	8-37	10-22	6.6-8.4	0-5	0	0.0-4.0	0
	37-60	20-30	7.4-8.4	10-20	0	0.0-2.0	0
	60-80	10-15	7.4-8.4	5-15	0	0.0-4.0	0
ReA:							
Realitos--------------	0-6	30-45	6.1-7.8	0-15	0-2	0.0-4.0	0-3
	6-49	30-45	6.6-8.4	0-15	0-2	0.0-4.0	0-6
	49-80	15-45	7.4-8.4	0-15	0-2	0.0-4.0	0-12
SaC:							
Salco-----------------	0-7	10-23	7.4-8.4	1-5	0	0.0-2.0	0-5
	7-26	10-23	7.4-8.4	4-25	0	0.0-2.0	0-10
	26-52	6.5-20	7.4-8.4	4-25	0	0.0-2.0	0-10
	52-80	8.0-20	7.4-8.4	15-25	0	0.0-2.0	5-20
SnC:							
Sarita----------------	0-8	1.0-5.0	6.1-7.2	0	0	0	0
	8-48	1.0-5.0	6.1-7.2	0	0	0	0
	48-80	5.0-20	5.6-8.4	0-5	0-2	0.0-2.0	0-8

Table 26.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	dS/m	
StA:							
Sinton	0-34	15-30	7.4-8.4	0-35	0	0	0
	34-80	15-30	7.4-8.4	0-30	0	0	0
TaA:							
Tela	0-9	15-30	6.6-7.8	0-5	0	0.0-2.0	0
	9-32	15-30	6.6-8.4	0-15	0	0.0-2.0	0-2
	32-80	10-30	7.9-8.4	2-30	0	0.0-2.0	0-2
TcA:							
Tiocano	0-10	30-45	6.6-8.4	0-15	0-2	0.0-4.0	0-12
	10-50	30-45	6.6-8.4	0-15	0-2	0.0-4.0	0-12
	50-80	15-45	7.4-8.4	0-15	0-2	0.0-4.0	0-12
WaB:							
Weesatche	0-7	10-25	7.0-8.1	0-5	0	0	0
	7-29	15-25	7.0-8.4	0-5	0	0	0
	29-40	15-30	7.0-8.4	5-15	0	0	0
	40-80	15-30	7.9-8.5	10-30	0	0	0
WaC:							
Weesatche	0-6	10-25	7.0-8.1	0-5	0	0	0
	6-35	15-25	7.0-8.4	0-5	0	0	0
	35-80	15-30	7.4-8.4	5-15	0	0	0
WeB:							
Weesatche	0-8	10-25	7.0-8.1	0-5	0	0	0
	8-30	15-25	7.0-8.4	0-5	0	0	0
	30-80	15-30	7.0-8.4	5-15	0	0	0

Table 27.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
AgC:										
Aguilares	B	Very low	Jan-Dec	---	---	---	---	None	---	None
AlA:										
Alet	B	Negligible	Jan-Dec	---	---	---	---	None	Very brief	Rare
AnC:										
Annarose	B	Low	Jan-Dec	---	---	---	---	None	---	None
BdC:										
Benavides	B	Low	Jan-Dec	---	---	---	---	None	---	None
BnC:										
Brennan	B	Very low	Jan-Dec	---	---	---	---	None	---	None
BrB:										
Brennan	B	Very low	Jan-Dec	---	---	---	---	None	---	None
BuA:										
Brundage	D	Medium	Jan-Dec	---	---	---	---	None	Very brief	Rare
CaA:										
Catarina	D	High	Jan-Dec	---	---	---	---	None	---	None
CmB:										
Colmena	B	Low	Jan-Dec	---	---	---	---	None	---	None
CoC:										
Comitas	A	Very low	Jan-Dec	---	---	---	---	None	---	None
CpC:										
Copita	B	Medium	Jan-Dec	---	---	---	---	None	---	None

Table 27.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
CyB:										
Coy	D	Medium	Jan-Dec	---	---	---	---	None	---	None
CZA:										
Czar	B	Negligible	Jan-Dec	---	---	---	---	None	Very brief	Rare
Clareville	C	Negligible	Jan-Dec	---	---	---	---	None	Very brief	Rare
DaB:										
Delfina	B	Low	Jan-Dec	---	---	---	---	None	---	None
DeA:										
Delfina	B	Very low	Jan-Dec	---	---	---	---	None	---	None
DfB:										
Delmita	C	Low	Jan-Dec	---	---	---	---	None	---	None
DmB:										
Delmita	C	Medium	Jan-Dec	---	---	---	---	None	---	None
DRB:										
Delmita	C	Low	Jan-Dec	---	---	---	---	None	---	None
Randado	D	Medium	Jan-Dec	---	---	---	---	None	---	None
GeB:										
Gertrudis	B	Low	Jan-Dec	---	---	---	---	None	---	None
GRD:										
Grava	C	High	Jan-Dec	---	---	---	---	None	---	None
HeB:										
Hebbronville	A	Very low	Jan-Dec	---	---	---	---	None	---	None
HoB:										
Houla	B	Very low	Jan-Dec	---	---	---	---	None	---	None
JdB:										
Jardin	D	High	Jan-Dec	---	---	---	---	None	---	None

Table 27.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
LoC:										
Lomart	C	Low	Jan-Dec	---	---	---	---	None	---	None
McB:										
Maverick	D	High	Jan-Dec	---	---	---	---	None	---	None
MgD:										
Mirasol	D	Very high	Jan-Dec	---	---	---	---	None	---	None
MoC:										
Moglia	C	Low	Jan-Dec	---	---	---	---	None	---	None
MwA:										
Monwebb	D	Negligible	Jan-Dec	---	---	---	---	None	Very brief	Occasional
NfC:										
Nueces	C	Very low	Jan-Dec	---	---	---	---	None	---	None
NuC:										
Nusil	C	Low	Jan-Dec	---	---	---	---	None	---	None
OmD:										
Olmedo	D	High	Jan-Dec	---	---	---	---	None	---	None
PgA:										
Papagua	C/D	Negligible	Jan-May	0.0	>6.0	0.0-1.0	Long	Occasional	---	None
			Jun-Aug	---	---	0.0-1.0	---	---	---	None
			Sep-Dec	0.0	>6.0	0.0-1.0	Long	Occasional	---	None
PmC:										
Pernitas	B	Very low	Jan-Dec	---	---	---	---	None	---	None
PnB:										
Pernitas	B	Very low	Jan-Dec	---	---	---	---	None	---	None
PRC:										
Piedras	D	High	Jan-Dec	---	---	---	---	None	---	None

Table 27.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
Cuevitas------------------	D	High	Jan-Dec	---	---	---	---	None	---	None
Ps:										
Pits, quarry--------------	---	---	---	---	---	---	---	---	---	None
PtB:										
Premont-------------------	B	Low	Jan-Dec	---	---	---	---	None	---	None
ReA:										
Realitos------------------	D	Negligible	Jan-Dec	---	---	0.0-2.0	Brief	Occasional	---	None
SaC:										
Salco---------------------	B	Very low	Jan-Dec	---	---	---	---	None	---	None
SnC:										
Sarita--------------------	A	Very low	Jan-Dec	---	---	---	---	None	---	None
StA:										
Sinton--------------------	B	Negligible	Jan-Dec	---	---	---	---	None	Brief	Occasional
TaA:										
Tela----------------------	B	Negligible	Jan-Dec	---	---	---	---	None	Very brief	Rare
TcA:										
Tiocano-------------------	D	Negligible	Jan-May	0.0	>6.0	0.0-2.0	Long	Occasional	---	None
			Jun-Aug	---	---	0.0-2.0	Long	Occasional	---	None
			Sep-Dec	0.0	>6.0	0.0-2.0	Long	Occasional	---	None
WaB:										
Weesatche-----------------	B	Very low	Jan-Dec	---	---	---	---	None	---	None
WaC:										
Weesatche-----------------	B	Very low	Jan-Dec	---	---	---	---	None	---	None
WeB:										
Weesatche-----------------	B	Very low	Jan-Dec	---	---	---	---	None	---	None

Table 28.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
AgC:						
Aguilares	---	---	---	---	High	Low
AlA:						
Alet	---	---	---	---	Moderate	Low
AnC:						
Annarose	Densic contact	40-60	40-20	noncemented	Low	Low
BdC:						
Benavides	---	---	---	---	High	Low
BnC:						
Brennan	---	---	---	---	Moderate	Low
BrB:						
Brennan	---	---	---	---	Moderate	Low
BuA:						
Brundage	---	---	---	---	High	Moderate
CaA:						
Catarina	---	---	---	---	High	Moderate
CmB:						
Colmena	---	---	---	---	Moderate	Low
CoC:						
Comitas	---	---	---	---	Low	Low
CpC:						
Copita	Paralithic bedrock	20-40	18-40	Strongly cemented	High	Low
CyB:						
Coy	---	---	---	---	High	Low
CZA:						
Czar	---	---	---	---	High	Low
Clareville	---	---	---	---	High	Low
DaB:						
Delfina	---	---	---	---	High	Low
DeA:						
Delfina	---	---	---	---	High	Low
DfB:						
Delmita	Petrocalcic	20-40	20-60	Strongly cemented	Moderate	Low
DmB:						
Delmita	Petrocalcic	20-40	20-60	Strongly cemented	Moderate	Low

Table 28.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
DRB:						
Delmita	Petrocalcic	20-40	28-32	Indurated	Moderate	Low
	Petrocalcic	53-61	20-24	Weakly cemented		
Randado	Petrocalcic	8-20	27-31	Strongly cemented	Moderate	Low
	Petrocalcic	20-80	34-38	Weakly cemented		
GeB:						
Gertrudis	---	---	---	---	High	Low
GRD:						
Grava	Petrocalcic	20-40	40-60	Strongly cemented	Moderate	Low
HeB:						
Hebbronville	---	---	---	---	Low	Low
HoB:						
Houla	---	---	---	---	High	Low
JdB:						
Jardin	Petrocalcic	17-22	4-57	Strongly cemented	High	Low
	Petrocalcic	22-80	57-65	Weakly cemented		
LoC:						
Lomart	Paralithic bedrock	20-40	40-60	Weakly cemented	High	Low
McB:						
Maverick	Densic bedrock	20-40	40-60	Noncemented	High	Low
MgD:						
Mirasol	Duripan	6-19	21-74	Strongly cemented	High	Low
MoC:						
Moglia	---	---	---	---	High	Low
MwA:						
Monwebb	---	---	---	---	High	Moderate
NfC:						
Nueces	---	---	---	---	Moderate	Low
NuC:						
Nusil	---	---	---	---	Low	Moderate
OmD:						
Olmedo	Petrocalcic	10-20	60-70	Indurated	High	Low
PgA:						
Papagua	---	---	---	---	High	Low
PmC:						
Pernitas	---	---	---	---	High	Low
PnB:						
Pernitas	---	---	---	---	High	Low

Table 28.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Uncoated steel	Concrete
		In	In			
PRC:						
Piedras	Petrocalcic	8-20	6-10	Strongly cemented	Moderate	Low
	Petrocalcic	20-26	63-71	Weakly cemented		
Cuevitas	Petrocalcic	6-14	6-26	Strongly cemented	Moderate	Low
	Petrocalcic	8-20	59-69	Weakly cemented		
Ps:						
Pits, quarry	---	---	---	---	---	---
PtB:						
Premont	---	---	---	---	High	Low
ReA:						
Realitos	---	---	---	---	High	Low
SaC:						
Salco	---	---	---	---	High	Low
SnC:						
Sarita	---	---	---	---	Low	Low
StA:						
Sinton	---	---	---	---	Moderate	Low
TaA:						
Tela	---	---	---	---	Moderate	Low
TcA:						
Tiocano	---	---	---	---	High	Low
WaB:						
Weesatche	---	---	---	---	High	Low
WaC:						
Weesatche	---	---	---	---	High	Low
WeB:						
Weesatche	---	---	---	---	High	Low

Table 29.--Physical Analyses of Selected Soils

(The abbreviation "COLE" means coefficient of linear extensibility. Dashes indicate that data were not available.)

Soil name and sample number	Depth	Hori-zon	Particle-size distribution: Sand: Very coarse (2.0-1.0 mm)	Coarse (1.0-0.5mm)	Medium (0.5-0.25mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2.0-0.05 mm)	Fine Silt (0.02-0.002 mm)	Total Silt	Fine Clay <0.0002 mm	Total Clay	COLE	Bulk Density: 1/3 bar	Oven Dry	Water Content 1/3 bar
	In		(by weight)										cm/cm	g/cc	g/cc	Wt %
Aguilares (1,4)																
99TX131007																
00P03293	0-6	A	0.2	1.3	21.0	38.1	10.4	71.0	4.5	14.4	---	14.6	0.002	1.53	1.54	6.1
00P03294	6-12	Bw1	0.3	0.6	19.5	34.2	10.0	64.6	6.6	17.2	---	18.2	0.019	1.34	1.42	7.6
00P03295	12-22	Bw2	0.1	0.9	16.8	32.2	9.9	59.9	8.4	19.8	---	20.3	0.019	1.37	1.45	7.8
00P03296	22-37	Bk1	1.0	1.0	15.3	27.6	10.5	55.4	11.2	22.7	---	21.9	0.022	1.45	1.55	8.0
00P03297	37-48	Bk2	0.1	0.7	11.1	24.8	9.9	47.1	15.4	28.9	---	24.0	0.020	1.45	1.54	8.2
00P03298	48-59	Bk3	0.3	0.5	12.1	21.6	9.9	44.4	17.3	31.3	---	24.3	0.017	1.47	1.55	7.9
00P03299	59-78	Bk4	2.0	2.4	10.7	15.5	8.1	38.7	22.9	36.1	---	25.2	0.014	1.54	1.62	8.6
00P03300	78-80	Cr	0.2	1.7	3.6	12.1	25.0	42.6	15.3	38.7	---	18.7	0.002	1.72	1.76	9.3
Benavides (1,3)																
S01TX-131-003																
01N04690	0-6	A	tr	0.1	4.1	39.3	19.5	63.0	3.2	19.1	12.5	17.9	0.023	1.41	1.51	15.4
01N04691	6-15	Bw	0.2	0.2	3.0	34.9	22.4	60.7	7.1	19.8	13.5	19.5	0.031	1.35	1.48	17.9
01N04692	15-34	Bk1	0.2	0.3	2.2	27.4	20.5	50.6	11.0	23.4	14.4	26.0	0.038	1.33	1.49	20.8
01N04693	34-40	Bk2	1.4	2.1	2.9	16.2	13.3	35.9	23.9	36.1	11.9	28.0	0.028	1.31	1.43	25.1
01N04694	40-52	Bk3	1.1	1.2	2.2	12.5	12.4	29.4	34.0	46.7	14.5	23.9	0.030	1.37	1.52	22.2
01N04695	52-74	BCk1	0.2	0.1	1.9	9.4	9.4	22.9	41.9	55.0	15.7	22.1	0.079	1.40	1.76	25.3
01N04696	74-85	BCk2	0.5	0.3	1.9	10.2	10.2	24.9	36.8	50.4	18.5	24.7	---	---	---	---
Coy (1,5)																
S01TX-131-004																
01N04697	0-6	Ap	0.1	0.2	2.9	25.4	12.4	41.0	10.5	23.3	25.0	35.7	0.063	1.14	1.37	35.1
01N04698	6-11	Bt1	tr	tr	2.0	19.7	12.1	33.8	12.8	22.5	33.6	43.7	0.084	1.10	1.40	35.4
01N04699	11-25	Bt2	tr	0.1	1.6	16.7	11.4	29.8	12.7	21.8	17.6	48.4	0.102	1.24	1.66	36.3
01N04700	25-33	Bt3	tr	0.1	2.0	17.6	9.4	29.1	13.6	22.4	22.1	48.5	0.107	1.21	1.64	37.6
01N04701	33-43	Bt4	---	0.1	2.3	17.9	9.9	30.2	13.6	22.3	22.8	47.5	0.116	1.15	1.60	41.1
01N04702	43-54	Btk	tr	0.1	1.8	17.3	11.2	30.4	14.5	23.9	20.5	45.7	0.010	1.19	1.59	39.3
01N04703	54-66	Bk1	tr	0.1	1.6	16.6	12.0	30.3	18.7	28.7	17.1	41.0	0.093	1.26	1.65	35.9
01N04704	66-80	Bk2	0.1	0.1	1.5	15.1	9.8	26.6	23.6	35.2	21.9	38.2	0.079	1.50	1.89	24.5
Grava (1,3)																
97TX131001																
97P02307	0-5	A	3.4	2.2	6.6	20.9	12.5	45.6	10.0	26.5	20.8	27.9	---	---	---	11.9
97P02308	5-18	Bt1	7.4	2.4	4.0	11.7	6.5	32.0	8.5	18.7	39.6	49.3	---	---	---	17.9
97P02309	18-27	Bt2	10.9	3.5	2.7	4.1	3.1	24.3	7.0	12.4	49.4	63.3	---	---	---	22.3
97P02310	27-30	BCk	14.6	10.3	6.9	7.0	4.7	43.5	16.3	23.9	11.6	32.6	---	---	---	15.4
97P02311	30-39	Bkm1	23.9	15.3	10.2	9.1	6.0	64.5	13.9	19.4	4.1	16.1	---	---	---	14.3
97P02312	39-45	Bkm2	23.0	17.4	13.8	11.1	6.5	71.8	15.3	24.1	0.7	4.1	---	---	---	6.3
Houla (1,3)																
78TX131002																
79P00020	0-9	A	0.3	1.8	6.8	15.6	11.0	35.5	10.7	28.4	1.9	36.1	---	---	---	---
79P00021	9-28	Bk1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
79P00022	28-65	Bk2	0.9	3.9	6.6	15.6	12.6	39.6	22.4	40.1	5.5	20.3	---	---	---	---

Table 29.--Physical Analyses of Selected Soils—Continued

Soil name and sample number	Depth	Hori-zon	Particle-size distribution: Sand: Very coarse (2.0-1.0 mm)	Coarse (1.0-0.5mm)	Medium (0.5-0.25mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2.0-0.05 mm)	Fine Silt (0.02-0.002 mm)	Total Silt	Fine Clay <0.0002 mm	Total Clay	COLE	Bulk Density: 1/3- bar	Oven Dry	Water Content 1/3- bar
	In		(by weight)										cm/cm	g/cc	g/cc	Wt %
Lomart (2,3)																
S80TX-131-002																
788	0-6	A	0.5	0.6	1.2	6.3	18.6	27.3	28.9	56.9	1.8	15.9	---	---	---	---
789	6-10	Bw	0.3	0.7	1.6	6.0	17.4	26.0	29.6	61.6	2.1	12.4	---	---	---	---
790	10-18	Cr/Bk	0.3	0.5	0.8	3.7	14.2	19.5	35.4	67.6	1.9	12.9	---	---	---	---
791	18-38	Cr/B	0.4	0.6	1.2	5.8	17.1	25.1	29.9	63.1	1.2	11.8	---	---	---	---
792	38-72	Cr	0.0	0.3	1.1	5.2	16.8	23.4	27.7	70.2	1.5	6.4	---	---	---	---
Maverick (1,6)																
99TX131002																
00P03301	0-6	A	0.2	0.3	0.9	7.5	6.2	15.1	16.3	24.1	24.0	60.8	0.134	1.09	1.59	44.6
00P03302	6-12	Bnyz	0.2	0.2	0.7	7.3	6.6	15.0	17.3	23.9	29.2	61.1	0.144	1.10	1.65	45.7
00P03303	12-21	Bnssyz	0.5	0.3	0.6	6.0	5.7	13.1	17.4	23.6	29.0	63.3	0.175	1.07	1.74	50.2
00P03304	21-35	Bcnssyz	tr	tr	0.2	0.7	0.9	1.8	15.7	16.0	27.0	82.2	0.178	1.12	1.83	48.5
00P03305	35-37	C1	0.1	tr	tr	0.1	0.1	0.3	22.1	22.0	22.8	77.7	0.207	1.08	1.90	51.6
00P03306	37-55	C1	0.3	0.3	0.1	0.6	2.5	3.8	24.1	31.7	23.0	64.5	---	---	---	---
00P03307	55-57	C2	0.1	tr	tr	0.1	0.1	0.3	19.7	20.2	26.0	79.5	0.093	1.16	1.90	46.9
00P03308	57-65	C2	0.1	0.6	0.5	0.5	1.8	3.5	21.5	23.6	23.5	72.9	---	---	---	---
00P03309	65-80	C3	tr	0.1	0.1	0.1	0.6	0.9	28.3	30.6	25.6	68.5	0.209	1.05	1.86	55.6
Pernitas (2,7)																
S81TX-131-001																
1137	0-5	A1	0.0	0.1	2.7	34.6	29.0	66.4	4.1	16.8	9.9	16.8	---	---	---	---
1138	5-11	A2	0.0	0.1	3.6	33.8	27.1	64.6	4.7	15.9	13.3	19.5	---	---	---	---
1139	11-16	Bt1	0.0	0.1	3.7	32.5	26.4	62.7	5.3	16.6	13.5	20.7	---	---	---	---
1140	16-28	Bt2	0.0	0.1	3.4	31.0	25.2	59.7	5.3	17.7	13.7	22.6	---	---	---	---
1141	28-37	Btk1	0.3	0.2	2.6	23.8	20.7	47.6	11.1	24.2	14.2	28.2	---	---	---	---
1142	37-49	Btk2	0.3	0.3	2.5	21.9	16.8	41.8	19.3	39.0	9.3	19.2	---	---	---	---
1143	49-65	Ck	0.0	0.1	2.2	27.3	19.9	49.5	8.4	25.5	17.8	25.0	---	---	---	---
Piedras (1,3)																
98TX131004																
99P00665	0-5	A	0.1	0.3	3.1	46.1	19.4	69.0	3.7	21.4	---	9.6	---	1.50	1.56	18.3
99P00666	5-16	Abk	2.0	1.2	3.1	42.3	17.1	65.7	5.8	21.8	---	12.5	---	---	---	---
99P00667	16-23	Bkm1	19.9	15.6	11.9	14.0	7.9	69.3	12.8	21.5	---	9.2	---	1.64	1.64	15.3
99P00668	23-53	Bkm2	7.7	9.6	8.3	28.0	9.9	63.5	20.9	29.7	---	6.8	---	1.93	1.95	10.1
99P00669	53-79	Bkm3	4.0	5.2	5.3	43.4	11.9	69.8	15.4	23.0	---	7.2	---	1.73	1.75	11.8
Premont (2,8)																
S06-TX131-001																
7184	0-8	Ap	0.1	0.3	3.0	53.8	24.5	81.7	3.2	9.5	7.1	8.7		---	---	---
7185	8-16	Bt1	0.0	0.1	2.6	48.6	22.1	73.4	4.1	10.2	13.8	16.4		1.51	1.62	21.0
7186	16-22	Bt2	0.0	0.2	2.6	46.1	20.3	69.2	3.4	11.4	15.2	19.4		1.490	1.61	23.2
7187	22-34	Bt3	0.0	0.1	2.6	42.6	20.1	65.4	4.2	12.3	17.1	22.3		1.550	1.72	20.5
7188	34-37	Btk	0.1	0.2	2.0	37.1	18.6	58.0	5.5	12.4	20.7	29.6		1.520	1.75	22.2
7189	37-49	2Btk1	0.3	0.3	2.1	36.2	18.6	57.5	7.2	14.9	17.6	27.6		1.460	1.62	21.9
7190	49-60	2Btk2	0.4	0.3	1.7	35.2	18.9	56.5	12.4	20.8	11.2	22.7		1.500	1.57	20.5
7191	60-80	2Bk	0.3	0.2	2.0	38.5	18.5	59.5	12.8	20.0	10.9	20.5		1.490	1.57	20.3

Table 29.--Physical Analyses of Selected Soils—Continued

Soil name and sample number	Depth	Hori-zon	Particle-size distribution										COLE	Bulk Density		Water Content
			Sand						Fine Silt (0.02-0.002 mm)	Total Silt	Fine Clay <0.0002 mm	Total Clay		1/3- bar	Oven Dry	1/3- bar
			Very coarse (2.0-1.0 mm)	Coarse (1.0-0.5mm)	Medium (0.5-0.25mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2.0-0.05 mm)								
	In		(by weight)										cm/cm	g/cc	g/cc	Wt %
Realitos-microlow (1,3)																
S01TX-131-002																
01N04678	0-5	A	tr	0.3	1.6	21.8	12.3	36.0	10.4	22.9	28.9	41.1	0.066	1.37	1.66	27.9
01N04679	5-17	Bw	tr	0.1	1.1	18.0	13.5	32.7	11.2	20.4	34.5	46.9	0.088	1.35	1.74	30.6
01N04680	17-30	Bss1	---	tr	0.9	18.8	13.9	33.6	11.0	20.8	33.5	45.6	0.086	1.32	1.69	32.4
01N04681	30-46	Bss2	---	tr	1.1	19.9	11.2	32.2	11.6	21.7	34.6	46.1	0.082	1.32	1.67	32.4
01N04682	46-56	Btss1	---	tr	1.2	19.4	11.5	32.1	11.0	21.8	33.2	46.1	0.088	1.28	1.65	33.9
01N04683	56-69	Btss2	---	---	1.0	19.9	13.7	34.6	10.6	21.3	31.0	44.1	0.083	1.34	1.70	31.7
01N04684	69-76	BCt	tr	0.1	2.0	35.2	18.7	56.0	5.4	14.7	21.3	29.3	0.056	1.45	1.71	23.3
01N04685	76-78	BC1	0.2	0.4	3.8	41.4	12.4	58.2	5.2	13.1	22.7	28.7	0.061	1.49	1.78	25.0
01N04686	78-84	BC2	---	0.2	5.6	50.1	14.4	70.3	2.4	9.5	16.0	20.2	0.036	1.61	1.79	18.3
Realitos-microhigh (1,9)																
S01TX-131-002A																
01N04687	0-6	A	0.1	0.1	1.2	20.7	15.3	37.4	10.6	21.4	30.0	41.2	0.081	1.36	1.72	28.0
01N04688	6-15	Bw	tr	0.1	0.9	18.9	14.2	34.1	10.9	20.0	34.5	45.9	0.097	1.35	1.78	30.5
01N04689	15-30	Bss	---	tr	1.3	22.6	10.6	34.5	10.3	20.7	34.0	44.8	0.088	1.35	1.74	31.3
Salco (2,3)																
S80TX-131-004																
798	0-7	A	2.1	8.3	18.4	14.8	10.8	54.4	11.5	24.0	7.2	21.6	---	---	---	---
799	7-16	Bt1	1.7	9.4	19.7	12.8	7.4	51.0	13.3	23.5	10.6	25.5	---	---	---	---
800	16-28	Bt2	1.2	7.8	16.3	12.3	7.8	45.4	13.9	25.2	12.2	29.4	---	---	---	---
801	28-38	Bt3	2.9	6.7	13.7	11.1	8.7	43.1	15.9	29.3	11.8	27.6	---	---	---	---
802	38-52	Btk	5.7	7.2	14.2	11.7	7.8	46.6	14.8	27.3	8.2	26.1	---	---	---	---
803	52-80	Ck	4.4	6.5	15.2	14.8	9.4	50.3	15.6	29.4	3.2	20.3	---	---	---	---

1 National Soil Survey Laboratory, USDA-NRCS, Lincoln, Nebraska.

2 Soil Characterization Laboratory, Texas A&M University, College Station, Texas.

3 Location of pedon sample is the same as that given in the series as described in the section "Soil Series and Their Morphology."

4 From the Duval and Webb County line on U.S. Highway 59, 6.2 miles northeast on U.S. Highway 59, 2.8 miles southeast on private road, 1.44 miles southwest on ranch road, about 2,100 feet northwest to oil well pad, and 100 feet west in rangeland.

5 From the Duval and McMullen County line on U.S. Highway 59, 6.4 miles south on U.S. Highway 59, 1.1 miles south on County Road 101, 5 miles south on ranch road, east 0.5 mile east on ranch road, and about 750 feet north in range.

6 From the Duval and Webb County line on U.S. Highway 59, 3.7 miles northwest on U.S. Highway 59 to road, 1.43 miles west on ranch road, and about 650 feet north in rangeland.

7 Duval County, Texas; from the intersection of Texas Highway 44 and Farm Road 3196, 2.2 miles north on caliche road, 0.6 mile northeast on dirt road, 0.4 mile southeast to junction, 0.1 mile south on road to fence, 1.5 miles south along fence, and 100 feet northeast in rangeland.

8 Duval County, Texas; from the intersection of Texas Highway 44 and FM 359, 1.15 miles south on FM 359 to FM 1329, 14.1 miles south on FM 1329 to ranch road, 1.57 miles west on ranch road, and 200 feet south in cropland.

9 Duval County, Texas; from the intersection of Texas Highway 359 and Texas Highway 339, 8.6 miles south on Texas Highway 339, 0.7 mile west on private ranch road, 0.8 mile north on field road, and 150 feet east in depression.

Table 30.--Chemical Analyses of Selected Soils

(Dashes indicate that analyses were not made)

Soil name and sample number	Depth	Hori-zon	Organic carbon	Total carbon	pH 1:1 (soil: water)	NH$_4$OAc extractable bases				Cation exchange capacity (NH$_4$OAc)	Base satur-ation (NH$_4$OAc)	SAR	EC	Calcium Carbonate Equivalent	Gypsum
						Ca	Mg	Na	K						
	In		Pct	Pct	pH	---------------- cmol(+) kg^{-1} ------------					Pct		dS/m	Pct	
Aguilares (1,4)															
99TX131007															
00P03293	0-6	A	---	---	8.5	42.4*	1.0	0.1	2.5	13.3	100	---	---	4.0	---
00P03294	6-12	Bw1	---	---	8.7	44.2*	1.5	0.3	2.9	13.1	100	---	---	7.0	---
00P03295	12-22	Bw2	---	---	8.6	46.4*	1.3	0.4	1.5	12.0	100	---	---	13.0	---
00P03296	22-37	Bk1	---	---	8.6	48.9*	1.2	0.4	0.8	12.1	100	---	---	16.0	---
00P03297	37-48	Bk2	---	---	8.6	49.6*	1.7	0.6	0.6	12.5	100	---	---	19.0	---
00P03298	48-59	Bk3	---	---	8.5	49.0*	2.0	1.4	1.1	14.4	100	---	---	22.0	---
00P03299	59-78	Bk4	---	---	8.6	47.0*	1.8	5.8	3.1	19.4	100	10	2.48	30.0	---
00P03300	78-80	Cr	---	---	9.0	46.2*	1.4	19.0	9.1	37.6	100	31	3.68	30.0	---
Benavides (1,3)															
S01TX-131-003															
01N04690	0-6	A	---	1.27	8.2	47.0*	1.3	0.2	0.8	12.0	100	---	---	4.0	---
01N04691	6-15	Bw	---	1.51	8.2	48.2*	1.3	0.2	0.6	11.9	100	---	---	8.0	---
01N04692	15-34	Bk1	---	2.21	8.2	50.8*	1.7	0.3	0.5	12.7	100	2	0.57	15.0	---
01N04693	34-40	Bk2	---	5.39	8.3	49.2*	1.8	0.5	0.3	10.4	100	2	0.57	43.0	---
01N04694	40-52	Bk3	---	5.27	8.2	48.3*	2.2	0.8	0.3	9.4	100	3	0.98	43.0	---
01N04695	52-74	BCk1	---	4.98	8.3	45.7*	2.9	1.3	0.3	8.8	100	5	1.69	41.0	---
01N04696	74-80	BCk2	---	4.06	8.3	44.8*	3.8	1.6	0.4	10.0	100	6	1.64	34.0	---
Coy (1,5)															
S01TX-131-004															
01N04697	0-6	Ap	---	2.82	7.8	39.2*	3.3	0.2	2.3	24.8	100	tr	0.59	1.0	---
01N04698	6-11	Bt1	---	2.19	7.8	39.1*	2.6	0.3	1.3	38.0	100	1	0.49	tr	---
01N04699	11-25	Bt2	---	2.07	8.1	63.3*	3.1	1.6	0.9	32.3	100	3	0.46	6.0	---
01N04700	25-33	Bt3	---	2.29	8.3	60.3*	4.7	3.6	1.0	29.1	100	10	0.73	9.0	---
01N04701	33-43	Bt4	---	2.18	8.4	56.0*	4.9	4.8	1.1	26.0	100	15	0.91	12.0	---
01N04702	43-54	Btk	---	2.23	8.5	55.1*	5.0	5.9	1.1	23.4	100	20	1.27	15.0	---
01N04703	54-66	Bk1	---	3.03	8.4	50.4*	4.10	5.60	0.8	17.2	100	20	2.59	24.0	---
01N04704	66-80	Bk2	---	4.26	8.3	48.8*	3.30	5.70	0.7	14.3	100	18	3.85	35.0	---
Grava (1,3)															
97TX131001															
97P02307	0-5	A	2.14	---	6.9	16.0	2.7	0.1	0.9	20.9	94	---	---	---	---
97P02308	5-18	Bt1	1.25	---	6.7	19.7	3.5	0.1	1.3	27.8	88	---	---	---	---
97P02309	18-27	Bt2	0.50	---	7.0	34.5	5.1	0.4	1.0	45.0	91	---	---	---	---
97P02310	27-30	BCk	0.67	---	8.0	46.5*	2.7	0.3	0.5	22.4	100	---	---	54.0	---
97P02311	30-39	Bkm1	0.75	---	7.9	47.2*	2.6	0.5	0.4	21.0	100	---	---	63.0	---
97P02312	39-80	Bkm2	0.11	---	8.1	44.4*	2.1	0.3	0.2	10.3	100	---	---	69.0	---
Houla (1,3)															
78TX131002															
79P00020	0-9	A	---	---	7.9	64.5*	2.3	0.2	2.0	32.7	100	---	---	3.0	---
79P00021	9-28	Bk1	---	---	8.0	71.5*	3.7	0.6	1.4	31.3	---	---	---	18.0	---
79P00022	28-80	Bk2	---	---	8.1	64.3*	4.0	1.0	1.7	26.5	100	---	---	20.0	---
Lomart (2,3)															
S80TX-131-002															
788	0-6	A	1.0	---	7.9	67.1	1.2	0.2	4.1	32.5	100	0	0.60	9.3	---
789	6-10	Bw	0.5	---	8.0	65.6	0.5	0.3	2.7	29.8	100	0	0.70	10.8	---
790	10-18	Cr/Bk	0.20	---	8.0	64.6	0.5	0.4	2.7	29.6	100	2	0.60	15.0	---
791	18-38	Cr/B	0.10	---	7.7	61.7	1.0	1.3	3.1	33.8	100	1	2.40	9.5	---
792	38-80	Cr	---	---	7.7	146.6	0.5	2.3	3.9	30.5	100	3	3.20	11.8	---
Maverick (1,6)															
99TX131002															
00P03301	0-6	A	---	2.26	7.9	69.0*	1.7	6.6	6.0	48.0	100	4	3.85	11.0	---
00P03302	6-12	Bnyz	---	1.96	8.0	121.5*	2.0	17.9	6.2	48.5	100	15	9.10	11.0	4.0
00P03303	12-21	Bnssyz	---	1.66	8.1	150.3*	3.3	34.1	6.4	48.5	100	33	13.99	10.0	7.0
00P03304	21-35	Bcnssyz	---	1.33	8.1	75.2*	3.4	34.3	2.6	43.5	100	30	11.73	11.0	---
00P03305	35-37	C1	---	1.33	8.0	75.8*	3.8	30.1	1.9	39.0	100	38	10.80	11.0	---
00P03306	37-55	C1	---	0.04	7.9	185.9*	2.1	19.8	1.3	24.7	100	34	14.80	tr	31.0
00P03307	55-57	C2	---	1.39	8.0	83.4*	4.1	29.7	2.0	38.1	100	29	12.83	11.0	---
00P03308	57-65	C2	---	0.04	7.7	184.7*	2.8	24.5	1.6	30.2	100	37	17.01	tr	51.0
00P03309	65-80	C3	---	0.76	7.9	112.3*	3.9	30.5	3.4	39.7	100	29	12.50	6.0	3

Table 30.--Chemical Analyses of Selected Soils--Continued

Soil name and sample number	Depth	Hori-zon	Organic carbon	Total carbon	pH 1:1 (soil: water)	NH_4OAc extractable bases: Ca	Mg	Na	K	Cation exchange capacity (NH_4OAc)	Base saturation (NH_4OAc)	SAR	Ec	Calcium carbonate equivalent	Gypsum
	In		Pct	Pct	pH	---------------- cmol(+) kg^{-1} ------------					Pct		dS/m	Pct	
Pernitas (2,7)															
S81TX-131-001															
1137	0-5	A1	0.85	---	7.9	26.8	1.4	0.1	0.9	15.0	100	0	0.50	0.7	---
1138	5-11	A2	0.68	---	8.1	42.1	1.4	0.1	0.6	14.4	100	0	0.40	2.9	---
1139	11-16	Bt1	0.52	---	8.2	45.9	1.4	0.1	0.4	15.0	100	0	0.30	4.5	---
1140	16-28	Bt2	0.32	---	8.2	52.0	1.0	0.2	0.4	14.8	100	1	0.40	7.5	---
1141	28-37	Btk1	0.28	---	8.1	51.7	1.4	0.1	0.5	15.1	100	0	0.30	13.5	---
1142	37-49	Btk2	0.47	---	8.2	53.6	1.4	0.1	0.4	13.9	100	0	0.30	20.0	---
1143	49-80	Ck	0.16	---	8.2	47.2	1.7	0.1	0.2	8.7	100	0	0.30	43.1	---
Piedras (1,3)															
98TX131004															
99P00665	0-5	A	---	---	7.5	12.2*	0.8	0.2	0.4	9.3	100	tr	1.11	tr	---
99P00666	5-16	Abk	---	---	7.9	45.6*	1.0	0.3	0.2	10.8	100	tr	0.88	10.0	---
99P00667	16-23	Bkm1	---	---	8.6	45.7*	0.6	0.4	---	1.3	100	---	---	81.0	---
99P00668	23-53	Bkm2	---	---	8.1	42.4*	2.1	0.9	---	2.3	100	6	1.50	55.0	---
99P00669	53-80	Bkm3	---	---	8.1	41.3*	2.3	1.8	tr	2.9	100	12	2.96	31.0	---
Premont (2,8)															
S06-TX131-001															
7184	0-8	Ap	0.49	---	5.9	3.8	1.4	0.1	0.9	7.6	82	---	---	---	---
7185	8-16	Bt1	0.46	---	6.5	5.9	2.3	0.1	0.7	12.3	73	---	---	---	---
7186	16-22	Bt2	0.41	---	7.1	9.2	2.3	0.1	0.4	14.5	83	---	---	---	---
7187	22-34	Bt3	0.35	---	7.9	11.8	2.8	0.1	0.4	16.4	92	0	0.50	---	---
7188	34-37	Btk	0.35	---	8.2	35.5	3.9	0.2	0.5	20.1	100	1	0.50	3.2	---
7189	37-49	2Btk1	0.27	---	8.2	35.3	3.9	0.2	0.4	17.7	100	1	0.60	8.7	---
7190	49-60	2Btk2	0.29	---	8.3	35.5	3.7	0.3	0.3	11.9	100	1	0.70	17.0	---
7191	60-80	2Bk	0.21	---	8.4	34.5	3.8	0.4	0.3	10.2	100	2	0.80	16.7	---
Realitos-microlow (1,3)															
S01TX-131-002															
01N04678	0-5	A	---	1.84	5.7	12.0	3.4	tr	2.2	20.2	87	3	0.42	---	---
01N04679	5-17	Bw	---	0.43	6.6	13.7	4.5	tr	2.1	21.4	95	---	---	---	---
01N04680	17-30	Bss1	---	0.40	6.8	13.7	4.7	0.2	1.8	21.1	97	---	---	---	---
01N04681	30-46	Bss2	---	0.25	7.1	13.8	4.9	0.5	2.0	21.5	99	---	---	---	---
01N04682	46-56	Btss1	---	0.13	7.5	13.3*	4.7	1.0	1.9	20.9	100	---	---	---	---
01N04683	56-69	Btss2	---	0.07	7.9	12.9*	4.7	1.4	1.9	20.2	100	---	---	tr	---
01N04684	69-76	BCt	---	0.05	8.2	8.8*	2.9	1.3	1.3	13.4	100	---	---	tr	---
01N04685	76-78	BC1	---	0.04	8.2	10.9*	3.0	1.5	1.3	14.2	100	---	---	tr	---
01N04686	78-80	BC2	---	0.02	8.3	6.0*	3.0	1.2	0.9	9.7	100	---	---	tr	---
Realitos-microhigh (1,9)															
S01TX-131-002A															
01N04687	0-6	A	---	1.72	5.6	12.4	4.0	0.3	1.7	20.6	89	---	---	---	---
01N04688	6-15	Bw	---	0.49	6.2	13.1	4.7	0.2	1.4	20.9	93	---	---	---	---
01N04689	15-80	Bss	---	0.35	6.7	13.0	5.1	0.4	1.6	21.0	96	---	---	---	---
Salco (2,3)															
S80TX-131-004															
798	0-7	A	0.92	---	8.0	47.3	1.4	0.1	5.8	21.3	100	0	0.50	2.3	---
799	7-16	Bt1	0.73	---	8.0	51.8	1.5	0.3	4.8	20.9	100	1	0.70	4.9	---
800	16-28	Bt2	0.49	---	8.0	59.2	1.5	0.3	3.0	21.6	100	1	0.50	7.9	---
801	28-38	Bt3	0.30	---	8.0	60.8	2.0	0.5	1.6	19.5	100	1	1.20	15.0	---
802	38-52	Btk	0.28	---	8.0	60.1	2.0	0.8	1.2	18.5	100	2	1.20	17.6	---
803	52-80	Ck	0.29	---	8.2	55.6	2.0	1.3	1.8	16.0	100	3	0.70	22.2	---

1 National Soil Survey Laboratory, USDA-NRCS, Lincoln, Nebraska.

2 Soil Characterization Laboratory, Texas A&M University, College Station, Texas.

3 Location of pedon sample is the same as that given in the series as described in the section "Soil Series and Their Morphology."

4 From the Duval and Webb County line on U.S. Highway 59, 6.2 miles northeast on U.S. Highway 59, 2.8 miles southeast on private road, 1.44 miles southwest on ranch road, about 2,100 feet northwest to oil well pad, and 100 feet west in rangeland.

5 From the Duval and McMullen County line on U.S. Highway 59, 6.4 miles south on U.S. Highway 59, 1.1 miles south on County Road 101, 5 miles south on ranch road, east 0.5 mile east on ranch road, and about 750 feet north in range.

6 From the Duval and Webb County line on U.S. Highway 59, 3.7 miles northwest on U.S. Highway 59 to road, 1.43 miles west on ranch road, and about 650 feet north in rangeland.

7 Duval County, Texas; from the intersection of Texas Highway 44 and Farm Road 3196, 2.2 miles north on caliche road, 0.6 mile northeast on dirt road, 0.4 mile southeast to junction, 0.1 mile south on road to fence, 1.5 miles south along fence, and 100 feet northeast in rangeland.

8 Duval County, Texas; from the intersection of Texas Highway 44 and FM 359, 1.15 miles south on FM 359 to FM 1329, 14.1 miles south on FM 1329 to ranch road, 1.57 miles west on ranch road, and 200 feet south in cropland.

9 Duval County, Texas; from the intersection of Texas Highway 359 and Texas Highway 339, 8.6 miles south on Texas Highway 339, 0.7 mile west on private ranch road, 0.8 mile north on field road, and 150 feet east in depression.

Table 31.--Clay Mineralogy of Selected Soils

(Total clay fraction. Dashes indicate that none of the mineral was detected)

Soil name and sample number	Depth	Horizon	Percentage of clay minerals (1)								
			MT	MI	H-I-S	KK	QZ	DO	CA	LC	M-V
	In										
Aguilares (2,4)											
99TX131007											
00P03295	12-22	Bw2	3	1	---	---	---	---	---	---	---
Benavides (2,3)											
S01TX-131-003											
01N04692	15-34	Bk1	2	2	---	1	1	---	3	---	---
01N04696	74-80	BCk2	2	3	---	1	tr	---	2	2	---
Coy (2,5)											
S01TX-131-004											
01N04698	6-11	Bt1	1	2	---	1	1	---	---	---	---
01N04700	25-33	Bt3	2	2	---	1	1	---	2	---	---
01N04704	66-80	Bk2	2	2	---	1	1	---	3	---	---
Grava (2,3)											
97TX131001											
97P02307	0-5	A	1	2	---	2	1	---	---	---	---
97P02309	18-27	Bt2	2	1	---	2	---	---	---	---	---
Houla (2,3)											
78TX131002			---	---	---	---	---	---	---	---	---
79P00021	9-28	Bk1	---	2	---	---	---	---	2	---	1
Maverick (2,6)											
99TX131002											
00P03303	12-21	Bnssyz	---	2	2	---	---	---	---	---	---
00P03304	21-35	Bcnssyz	---	---	3	---	1	---	---	---	---
Piedras (2,3)											
98TX131004											
99P00667	16-23	Bkm1	---	---	---	---	---	1	5	---	---
Realitos-microlow (2,3)											
S01TX-131-002											
01N04680	17-30	Bss1	---	2	---	1	1	---	---	---	---
01N04685	76-78	BC1	2	2	---	2	1	---	---	---	---
01N04686	78-80	BC2	---	1	---	1	1	---	---	---	---
Realitos-microhigh (2,7)											
S01TX-131-002A											
01N04689	15-30	Bss	---	2	---	2	1	---	---	---	---

1 MT-Montmorillinite; MI-Mica; H-I-S-Hydrous-Illite-Smectite; KK-Kaolonite; QZ-Quartz; DO-Dolomite; CA-Calcite; LC-Lepidocrocite; M-V-Montmorillonite-Vermiculite

2 National Soil Survey Laboratory, USDA-NRCS, Lincoln, Nebraska.

3 Location of pedon sample is the same as that given in the series as described in the section "Soil Series and Their Morphology."

4 From the Duval and Webb County line on U.S. Highway 59, 6.2 miles northeast on U.S. Highway 59, 2.8 miles southeast on private road, 1.44 miles southwest on ranch road, about 2,100 feet northwest to oil well pad, and 100 feet west in rangeland.

5 From the Duval and McMullen County line on U.S. Highway 59, 6.4 miles south on U.S. Highway 59, 1.1 miles south on County Road 101, 5 miles south on ranch road, 0.5 mile east on ranch road, and about 750 feet north in range.

6 From the Duval and Webb County line on U.S. Highway 59, 3.7 miles northwest on U.S. Highway 59 to road, 1.43 miles west on ranch road, and about 650 feet north in rangeland.

7 Duval County, Texas; from the intersection of Texas Highway 359 and Texas Highway 339, 8.6 miles south on Texas Highway 339, 0.7 mile west on private ranch road, 0.8 mile north on field road, and 150 feet east in depression.

Table 32.--Grain Count of Selected Soils

(Fine sand fraction. Analysis by National Soil Survey Laboratory, USDA-NRCS, Lincoln, Nebraska. Dashes indicate that the material was not detected.)

Soil sample and Laboratory number	Depth	Horizon	Dominant Mineral (1)																
			QZ	OT	FK	FP	FE	CD	CB	CA	GS	PR	CR	GN	OP	HN	AR	TM	ZR
Aguilares (2,4)																			
99TX131007																			
00P03295	12-22	Bw2	39		14	17	tr	18	2	1		tr	3	tr	tr		6		
Benavides (2,3)																			
S01TX-131-003																			
01N04692	15-34	Bk1	81		10		1	8	tr	tr	tr	tr			tr	tr		tr	
01N04696	74-80	BCk2	69		10		1	13	4	1		tr			tr				tr
Coy (2,5)																			
S01TX-131-004																			
01N04698	6-11	Bt1	76		11	tr	2	10			tr	tr			tr				
01N04700	25-33	Bt3	81		12	tr	tr	6		1		tr			tr	tr			
01N04704	66-80	Bk2	75		12	tr	1	7	1	3					tr		tr		
Piedras (2,3)																			
98TX131004																			
99P00667	16-23	Bkm1	25	1	4			3	67	1									
Realitos-microlow (2,3)																			
S01TX-131-002																			
01N04680	17-30	Bss1	93		2		1	5				tr			tr				
01N04685	76-78	BC1	89		6		1	5				tr		tr	tr				
01N04686	78-80	BC2	89		6		1	4			tr			tr	tr			tr	

1 QZ-Quartz; OT-Other; FK-Potassium Feldspar; FP-Plagioclase Feldspar; FE-Iron Oxides (Goethite); CD-Chert (Chalcedony); CB-Carbonate Aggregates; CA-Calcite; GS-Glass; PR-Pyroxene; CR-Cristobalite; GN-Garnet; OP-Opagues; HN-Hornblende; AR-Weatherable aggregates; TM-Tourmaline; ZR-Zircon;

2 National Soil Survey Laboratory, USDA-NRCS, Lincoln, Nebraska

3 Location of pedon sample is the same as that given in the series as described in the section "Soil Series and Their Morphology."

4 From the Duval and Webb County line on U.S. Highway 59, 6.2 miles northest on U.S. Highway 59, 2.8 miles southeast on private road, 1.44 miles southwest on ranch road, about 2,100 feet northwest to oil well pad, and 100 feet west in rangeland.

5 From the Duval and McMullen County line on U.S. Highway 59, 6.4 miles south on U.S. Highway 59, on 1.1 miles south on County Road 101, 5 miles south on ranch road, 0.5 mile east on ranch road, and about 750 feet north in range.

Table 33.--Taxonomic Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
*Aguilares	Fine-loamy, mixed, superactive, hyperthermic, Aridic Calciustepts
Alet	Fine-loamy, mixed, superactive, hyperthermic, Typic Argiustolls
Annarose	Coarse-loamy, mixed, superactive, hyperthermic, Aridic Calciustepts
Benavides	Fine-loamy, mixed, superactive, hyperthermic, Aridic Calciustolls
Brennan	Fine-loamy, mixed, superactive, hyperthermic, Aridic Haplustalfs
Brundage	Fine-loamy, mixed, superactive, hyperthermic, Aridic Natrustalfs
Catarina	Fine, smectitic, hyperthermic, Sodic Haplusterts
Clareville	Fine, smectitic, hyperthermic, Pachic Argiustolls
Colmena	Fine-loamy, mixed, superactive, hyperthermic, Typic Argiustolls
Comitas	Loamy, mixed, active, hyperthermic, Arenic Aridic Paleustalfs
Copita	Fine-loamy, mixed, active, hyperthermic, Aridic Calciustepts
Coy	Fine, smectitic, hyperthermic, Pachic Vertic Argiustolls
Cuevitas	Loamy, mixed, active, hyperthermic, shallow, Aridic Haplustepts
Czar	Fine-loamy, mixed, superactive, hyperthermic, Pachic Argiustolls
Delfina	Fine-loamy, mixed, superactive, hyperthermic, Typic Paleustalfs
Delmita	Fine-loamy, mixed, superactive, hyperthermic, Petrocalcic Paleustalfs
Gertrudis	Fine-loamy, mixed, active, hyperthermic, Typic Calciustolls
Grava	Clayey-skeletal, smectitic, hyperthermic, Petrocalcic Paleustolls
Hebbronville	Coarse-loamy, mixed, active, hyperthermic, Aridic Haplustalfs
Houla	Fine-loamy, mixed, superactive, hyperthermic, Aridic Calciustolls
Jardin	Loamy, mixed, superactive, hyperthermic, shallow, Petrocalcic Paleustolls
Lomart	Coarse-loamy, mixed, superactive, hyperthermic, Aridic Calciustepts
Maverick	Fine, smectitic, hyperthermic, Aridic Haplustepts
Mirasol	Loamy-skeletal, mixed, superactive, hyperthermic, shallow, Typic Durustepts
Moglia	Fine-loamy, mixed, active, hyperthermic, Aridic Calciustepts
Monwebb	Fine, smectitic, hyperthermic, Sodic Haplusterts
Nueces	Loamy, mixed, active, hyperthermic, Arenic Paleustalfs
Nusil	Loamy, mixed, active, hyperthermic, Arenic Paleustalfs
Olmedo	Loamy-skeletal, carbonatic, hyperthermic, shallow, Petrocalcic Calciustolls
Papagua	Fine, mixed, active, hyperthermic, Typic Albaqualfs
Pernitas	Fine-loamy, mixed, superactive, hyperthermic, Typic Argiustolls
Piedras	Loamy-skeletal, mixed, active, hyperthermic, shallow, Petrocalcic Calciustepts
Premont	Fine-loamy, mixed, superactive, hyperthermic, Typic Haplustalfs
Randado	Loamy, mixed, superactive, hyperthermic, shallow, Petrocalcic Paleustalfs
Realitos	Fine, smectitic, hyperthermic, Typic Haplusterts
Salco	Fine-loamy, mixed, superactive, hyperthermic, Aridic Argiustolls
Sarita	Loamy, mixed, active, hyperthermic, Grossarenic Paleustalfs
Sinton	Fine-loamy, mixed, superactive, hyperthermic, Cumulic Haplustolls
Tela	Fine-loamy, mixed, superactive, hyperthermic, Aridic Argiustolls
Tiocano	Fine, smectitic, hyperthermic, Udic Haplusterts
Weesatche	Fine-loamy, mixed, superactive, hyperthermic, Typic Argiustolls

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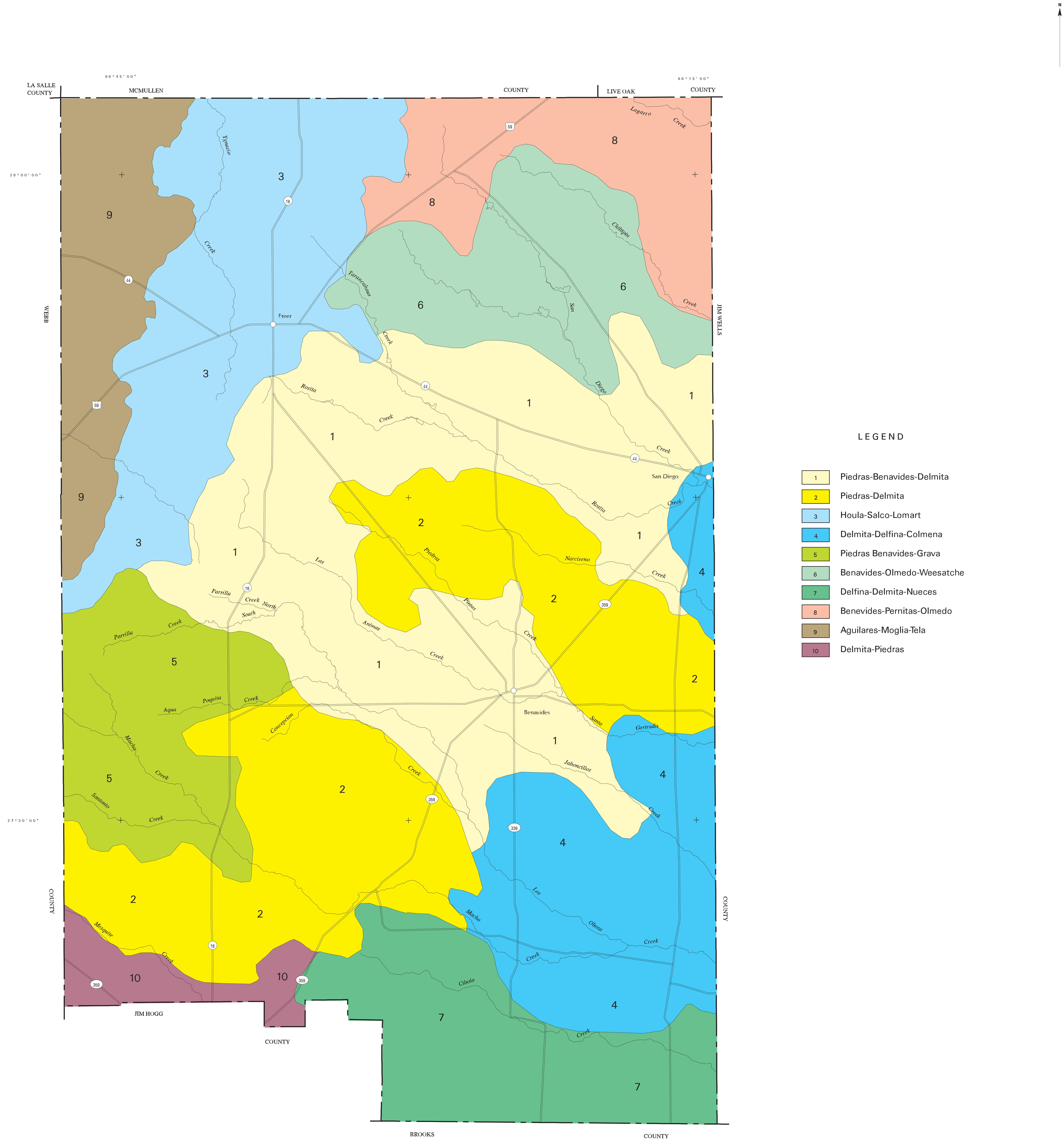

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TEXAS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

DUVAL COUNTY, TEXAS

MILES

KILOMETERS

SCALE = 1:185000

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS
DUVAL COUNTY, TEXAS

MILES

KILOMETERS

SCALE = 1:185000

SOIL LEGEND

Soil map symbols are in alphabetical order. The first letter, always a capital, is the initial letter of the soil series or miscellaneous area name. The second letter is lowercase, except in associations, undifferentiated groups, and miscellaneous area name. The third letter, if present, represents the slope class.

SYMBOL	NAME
AgC	Aguilares fine sandy loam, 1 to 5 percent slopes
AlA	Alet sandy clay loam, 0 to 1 percent slopes, rarely flooded
AnC	Annarose fine sandy loam, 2 to 5 percent slopes
BdC	Benavides fine sandy loam, 2 to 5 percent slopes
BnC	Brennan loamy fine sand, 1 to 5 percent slopes
BrB	Brennan fine sandy loam, 0 to 3 percent slopes
BuA	Brundage fine sandy loam, 0 to 2 percent slopes, rarely flooded
CaA	Catarina clay, 0 to 1 percent slopes
CmB	Colmena fine sandy loam, 0 to 3 percent slopes
CoC	Comitas loamy fine sand, 0 to 5 percent slopes
CpC	Copita sandy clay loam, 1 to 5 percent slopes
CyB	Coy clay loam, 1 to 3 percent slopes
CZA	Czar-Clareville soils, 0 to 1 percent slopes, rarely flooded
DaB	Delfina loamy fine sand, 0 to 3 percent slopes
DeA	Delfina fine sandy loam, 0 to 2 percent slopes
DfB	Delmita loamy fine sand, 0 to 3 percent slopes
DmB	Delmita fine sandy loam, 0 to 3 percent slopes
DRB	Delmita-Randado complex, 0 to 3 percent slopes
GeB	Gertrudis fine sandy loam, 0 to 3 percent slopes
GRD	Grava soils, 1 to 8 percent slopes
HeB	Hebbronville fine sandy loam, 1 to 3 percent slopes
HoB	Houla clay loam, 0 to 3 percent slopes
JdB	Jardin fine sandy loam, 1 to 3 percent slopes
LoC	Lomart loam, 1 to 5 percent slopes
McB	Maverick clay, 1 to 3 percent slopes
MgD	Mirasol very gravelly sandy loam, 1 to 8 percent slopes
MoC	Moglia clay loam, 1 to 5 percent slopes
MwA	Monwebb clay, 0 to 1 percent slopes, occasionally flooded
NfC	Nueces fine sand, 0 to 5 percent slopes
NuC	Nusil loamy fine sand, 1 to 5 percent slopes
OmD	Olmedo very gravelly sandy loam, 1 to 8 percent slopes
PgA	Papagua fine sandy loam, 0 to 1 percent slopes
PmC	Pernitas fine sandy loam, 1 to 5 percent slopes
PnB	Pernitas sandy clay loam, 1 to 3 percent slopes
PRC	Piedras and Cuevitas soils, 1 to 5 percent slopes
Ps	Pits, quarry
PtB	Premont fine sandy loam, 0 to 3 percent slopes
ReA	Realitos clay, 0 to 1 percent slopes
SaC	Salco sandy clay loam, 1 to 5 percent slopes
SnC	Sarita fine sand, 0 to 5 percent slopes
StA	Sinton sandy clay loam, 0 to 1 percent slopes, occasionally flooded
TaA	Tela sandy clay loam, 0 to 1 percent slopes, rarely flooded
TcA	Tiocano clay, 0 to 1 percent slopes, ponded
WaB	Weesatche fine sandy loam, 1 to 3 percent slopes
WaC	Weesatche fine sandy loam, 3 to 5 percent slopes
WeB	Weesatche sandy clay loam, 1 to 3 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline and neatline
- Previously published survey

OTHER BOUNDARY

- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

- Divided roads
- Other roads
- Trail

ROAD EMBLEMS AND DESIGNATIONS

- Interstate 173 79 345
- Federal 287 410 224
- State 52 52 347
- County, farm or ranch 1283

RAILROAD

POWER TRANSMISSION LINE

PIPELINE

FENCE

LEVEES

- Without road
- With road
- With railroad
- Single side slope

DAMS

- Medium or small

LANDFORM FEATURES

- Prominent hill or peak
- Soil sample site

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house
- Church
- School
- Other religion — Mt Carmel
- Located object — Ranger Station
- Tank — Petroleum
- Lookout tower
- Oil and/or natural gas wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

RIVERS, STREAMS, DRAINAGE, AND IRRIGATION

- Watercourse

SMALL LAKES, PONDS, AND RESERVOIRS

- Perennial water
- Miscellaneous water
- Flood pool line — FLOOD POOL LINE

MISCELLANEOUS WATER FEATURES

- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS — AgC AlA

LANDFORM FEATURES

- Bedrock escarpment
- Other than bedrock escarpment
- Short steep slope
- Gully
- Depression, closed
- Sinkhole
- Borrow pit
- Gravel pit
- Mine or quarry
- Landfill

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Clay spot
- Gravelly spot
- Lava spot
- Marsh or swamp
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
PIEDRA CREEK SE QUADRANGLE
SHEET NUMBER 01 OF 42

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

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Kilometers

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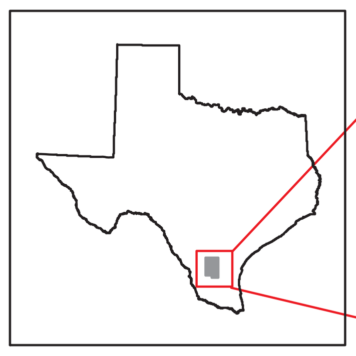
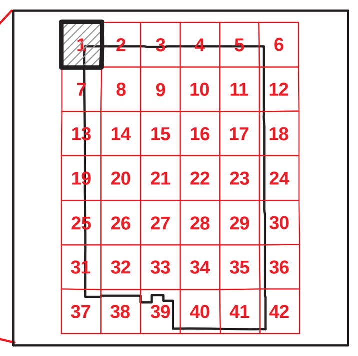
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

PIEDRA CREEK SE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 01 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
MIRASOL CREEK QUADRANGLE
SHEET NUMBER 02 OF 42

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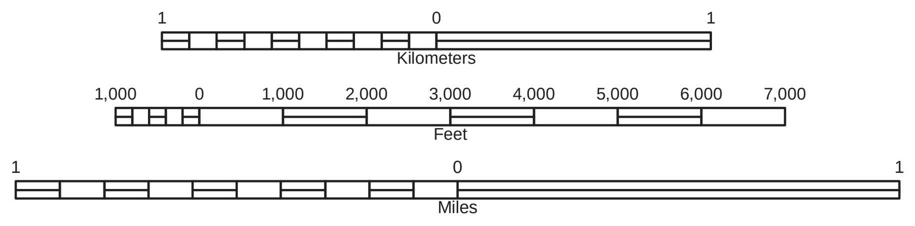
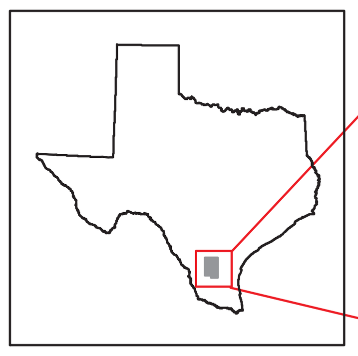
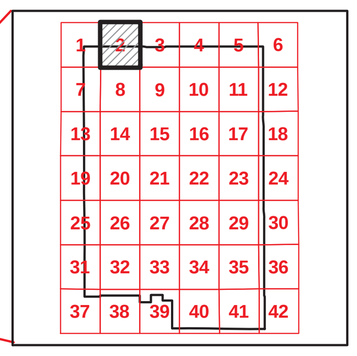




DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

MIRASOL CREEK, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 02 OF 42

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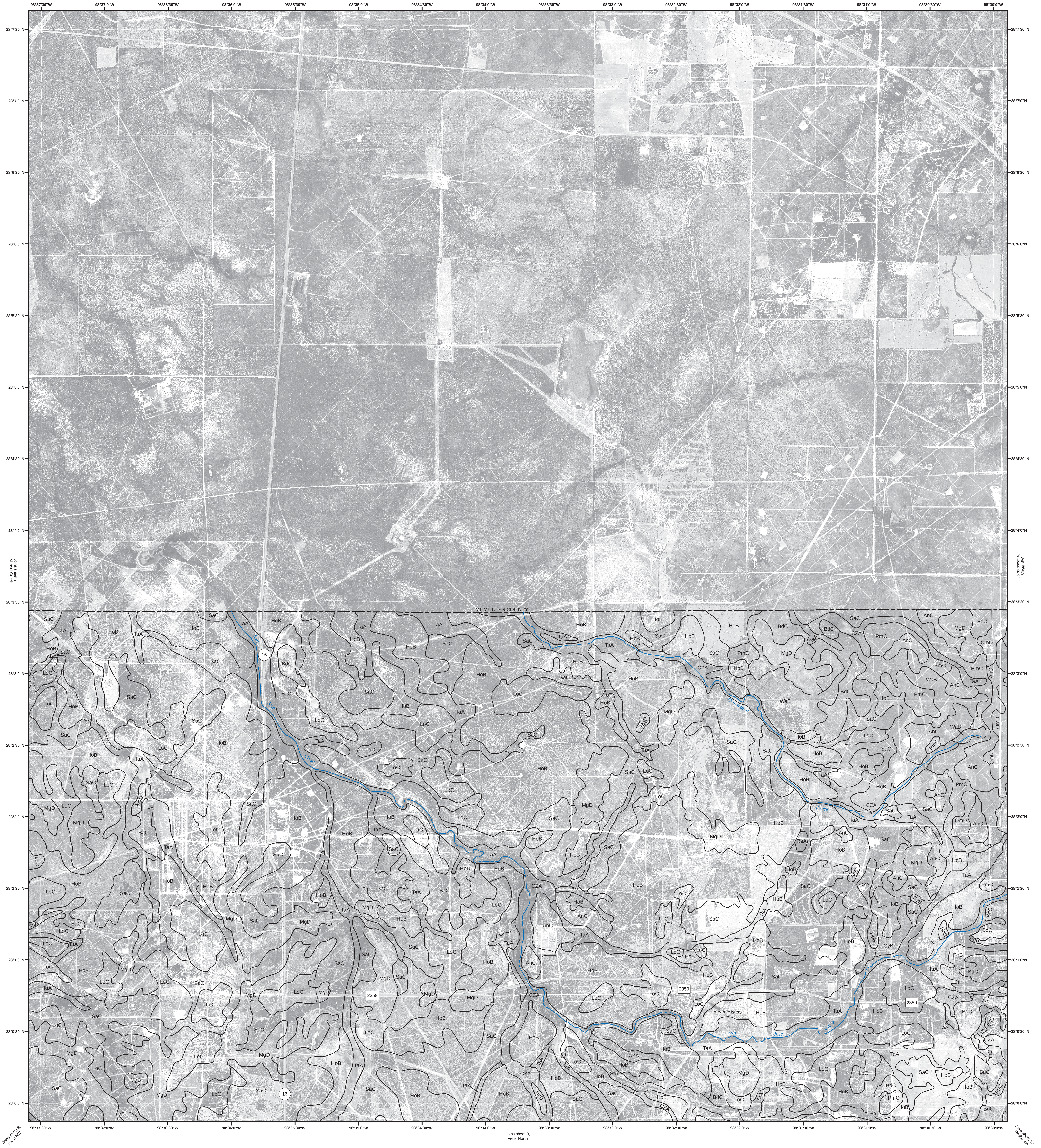
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
LOMA ALTA QUADRANGLE
SHEET NUMBER 03 OF 42



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N

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Feet

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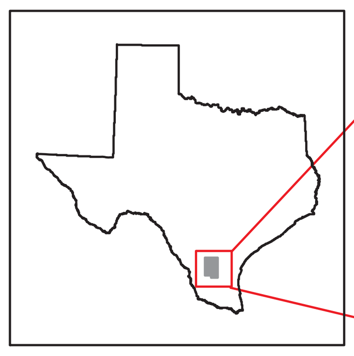
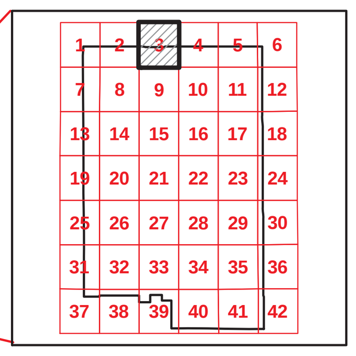
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

LOMA ALTA, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 03 OF 42

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
CLEGG SW QUADRANGLE
SHEET NUMBER 04 OF 42

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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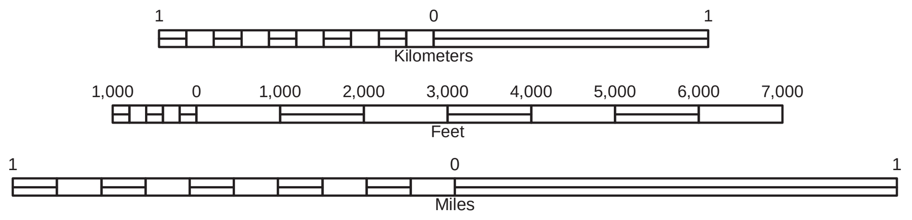

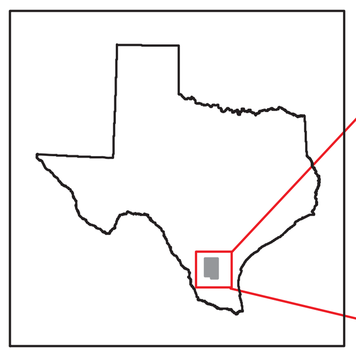

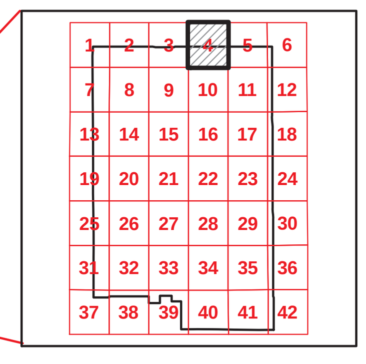

CLEGG SW, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 04 OF 42

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
CLEGG QUADRANGLE
SHEET NUMBER 05 OF 42

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N

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Feet

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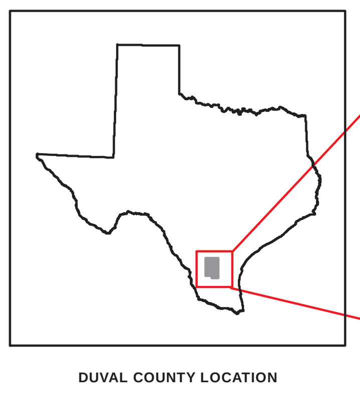
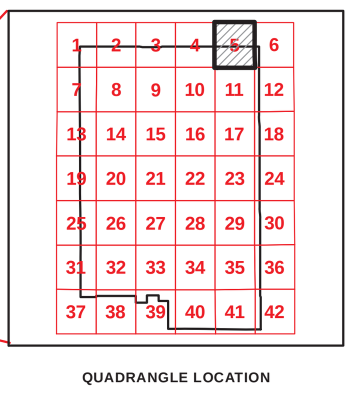
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

CLEGG, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 05 OF 42

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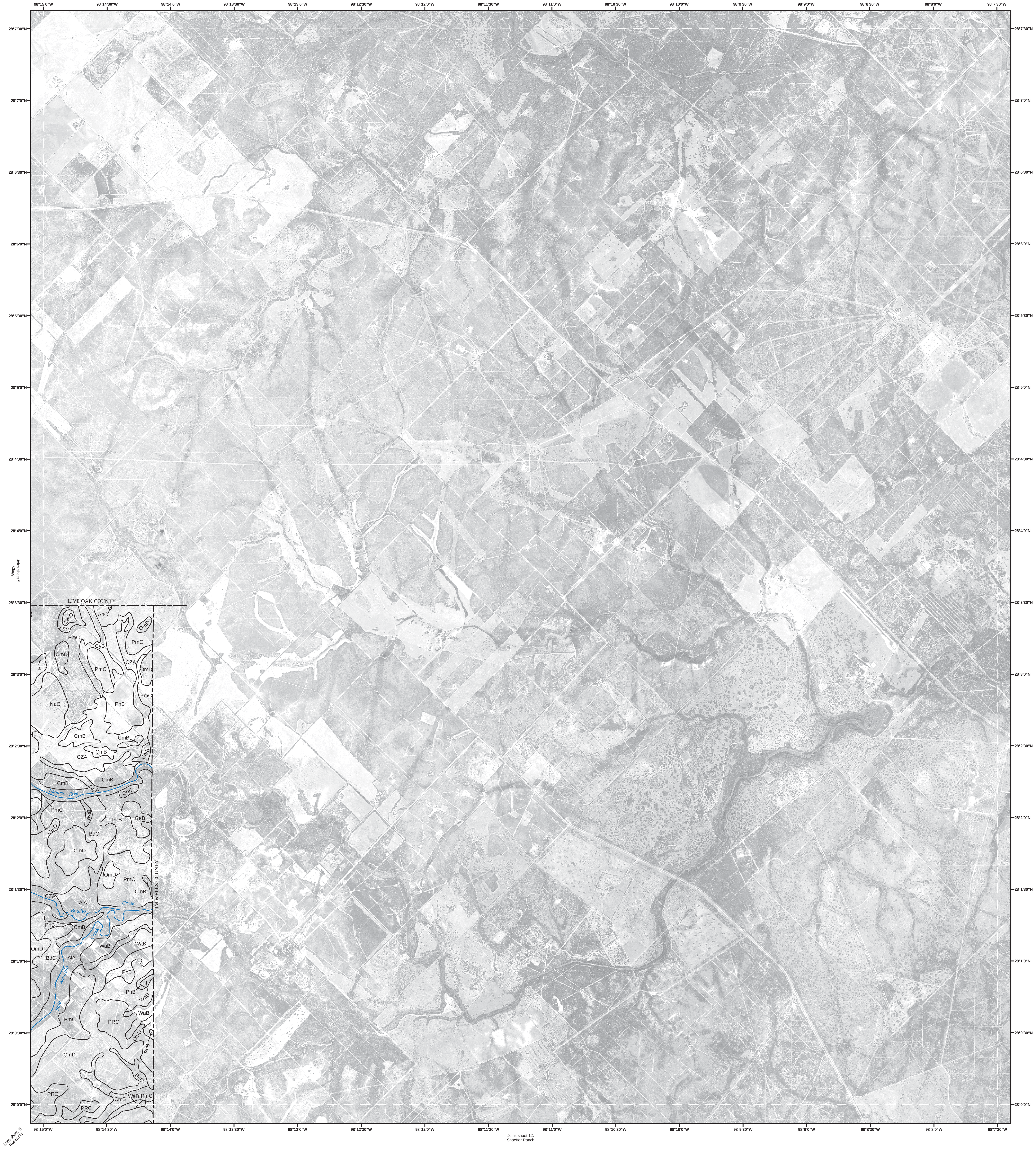
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
ANNA ROSE QUADRANGLE
SHEET NUMBER 06 OF 42



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N

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Kilometers

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Feet

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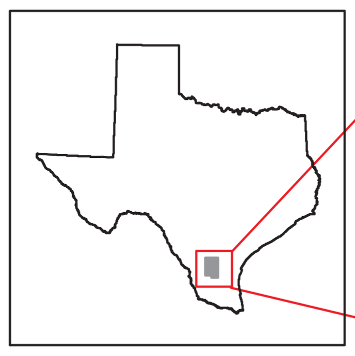
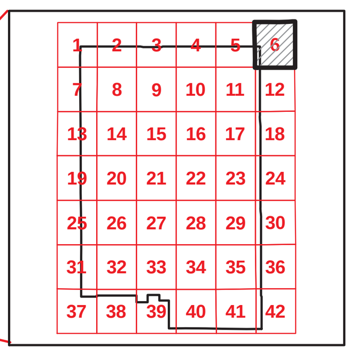
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

ANNA ROSE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 06 OF 42

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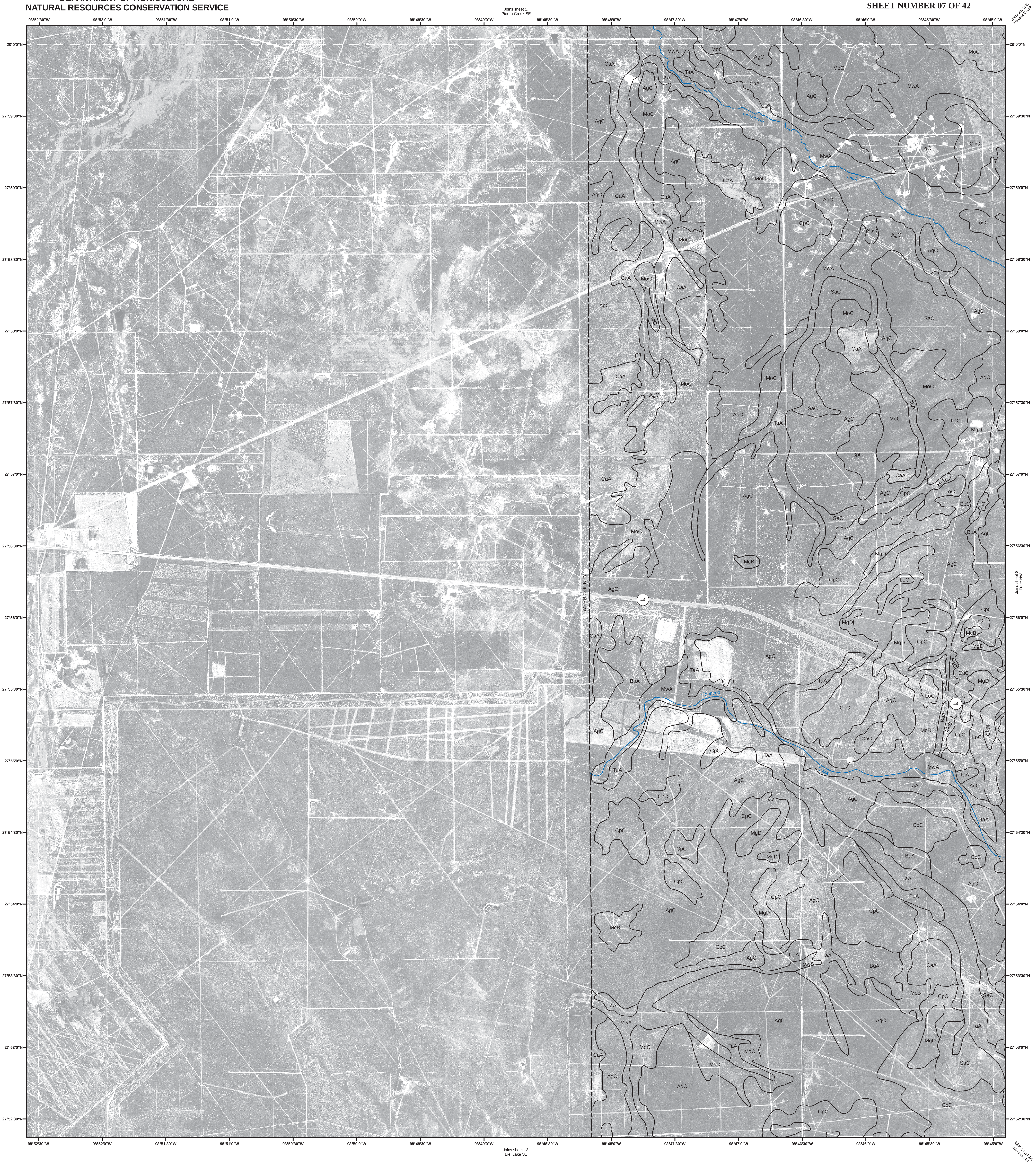
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
BIEL LAKE NE QUADRANGLE
SHEET NUMBER 07 OF 42



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N

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Feet

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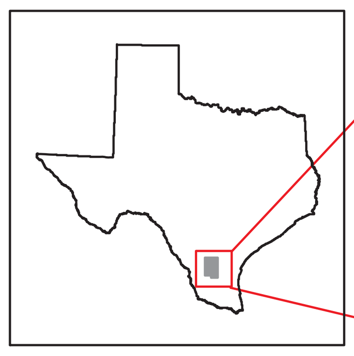
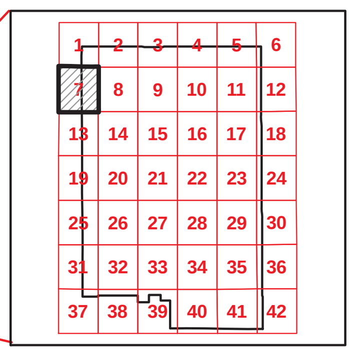
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

BIEL LAKE NE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 07 OF 42

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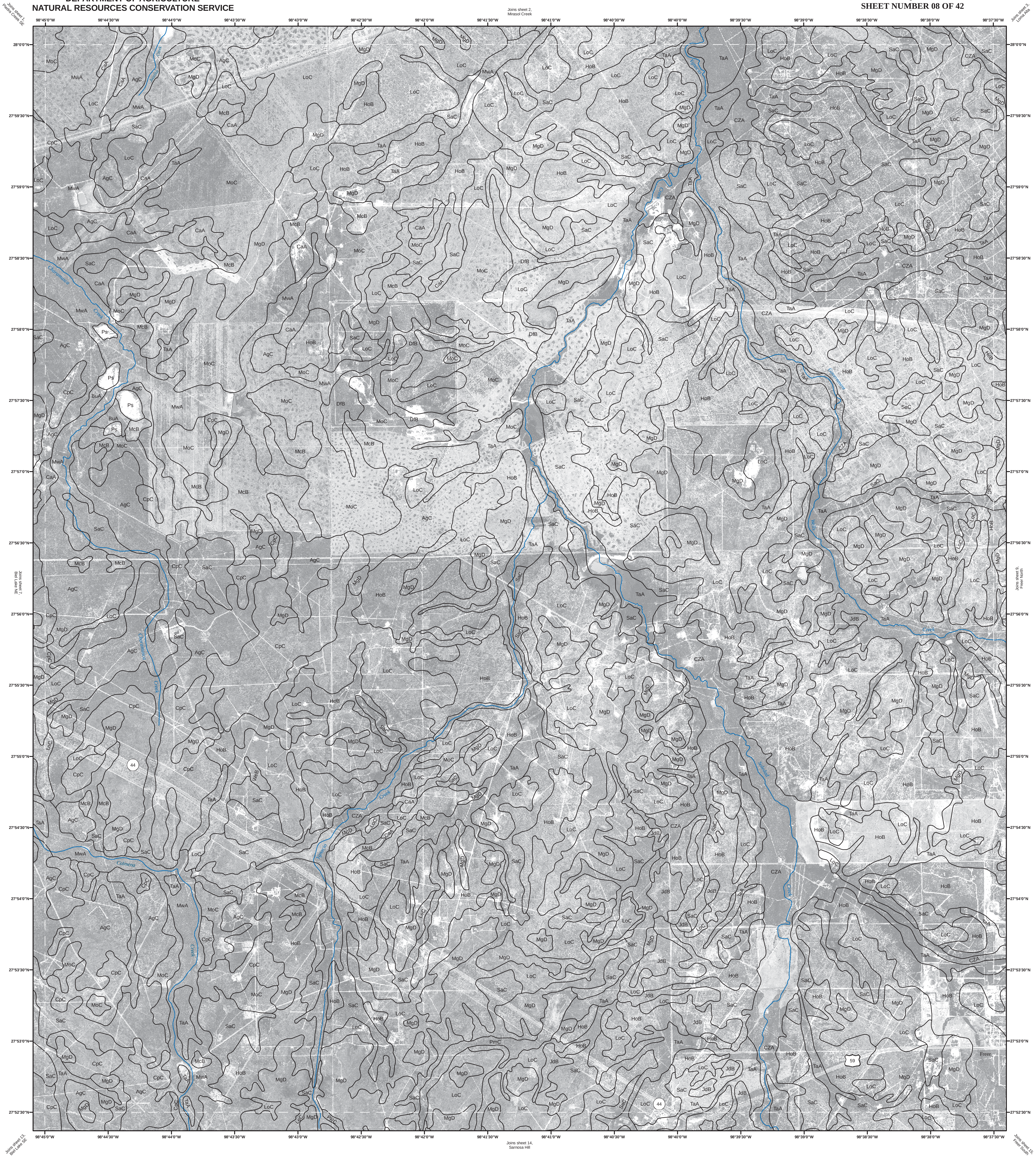
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
FREER NW QUADRANGLE
SHEET NUMBER 08 OF 42



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N

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Kilometers

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Feet

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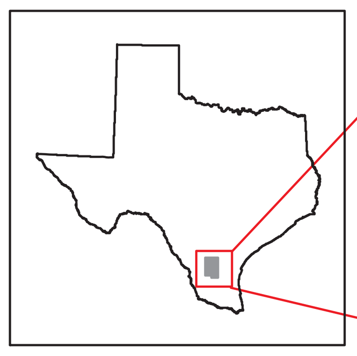
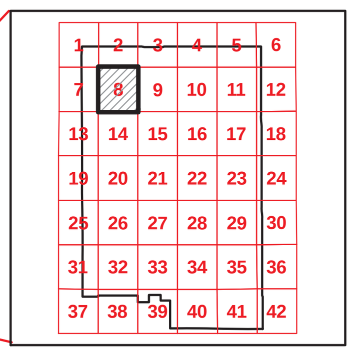
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

FREER NW, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 08 OF 42

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
FREER NORTH QUADRANGLE
SHEET NUMBER 09 OF 42

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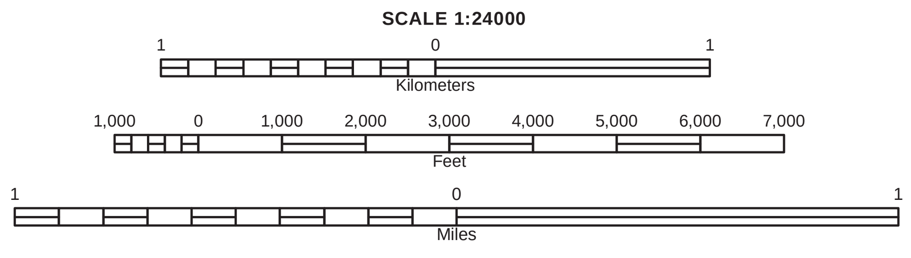
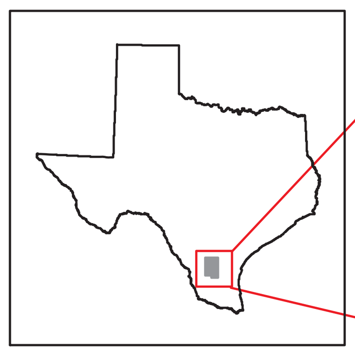
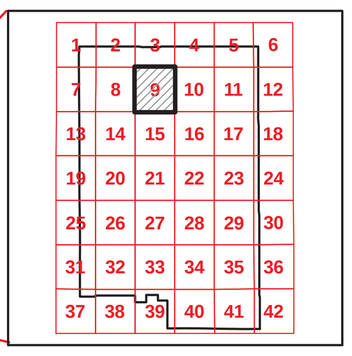




DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

FREER NORTH, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 09 OF 42

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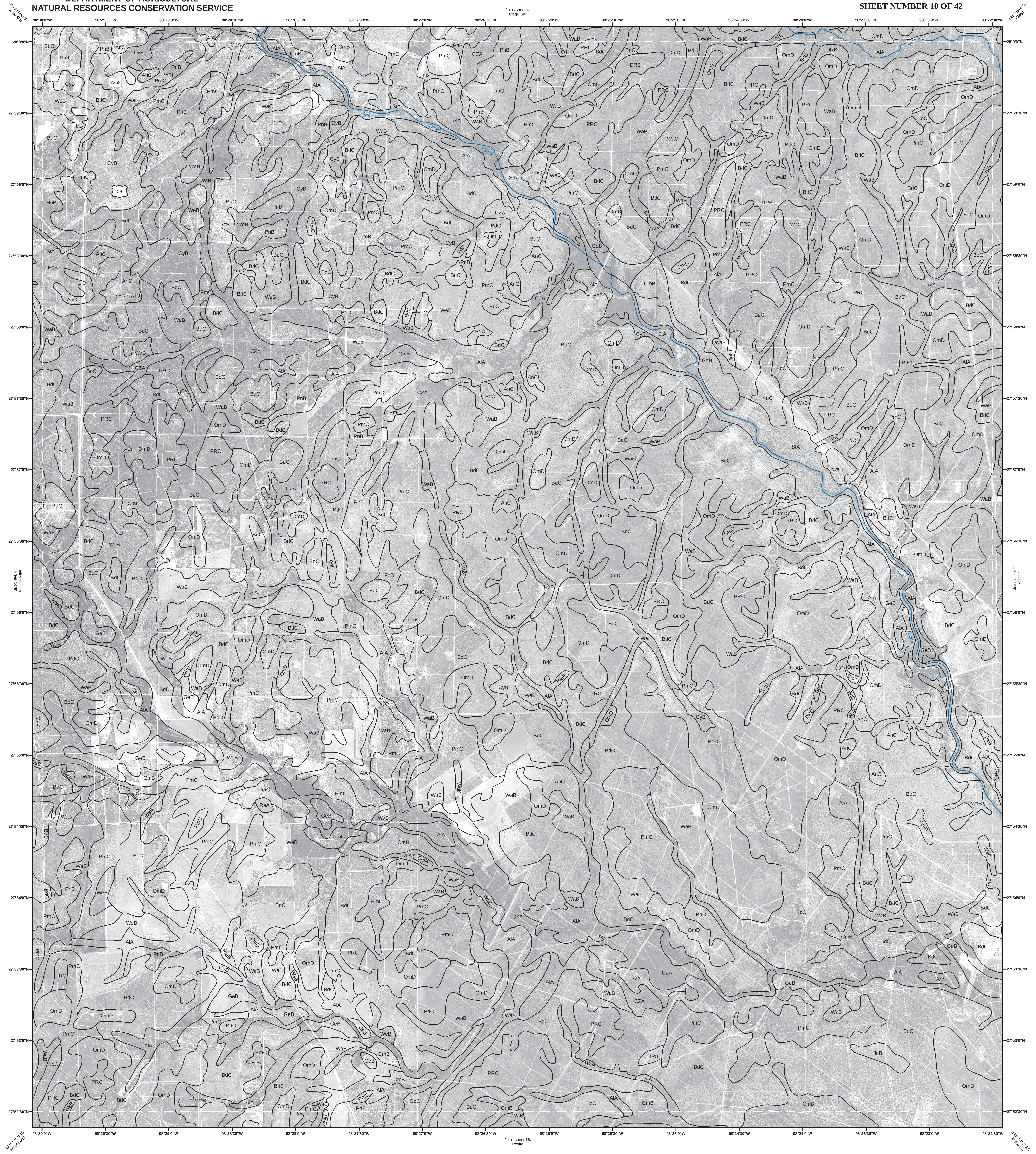
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
ROSITA NW QUADRANGLE
SHEET NUMBER 10 OF 42



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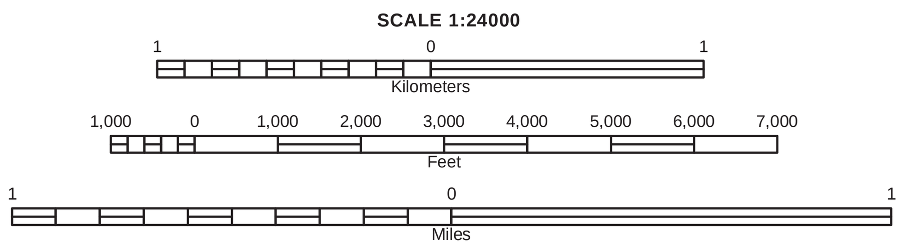
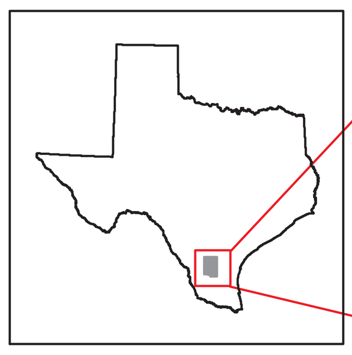
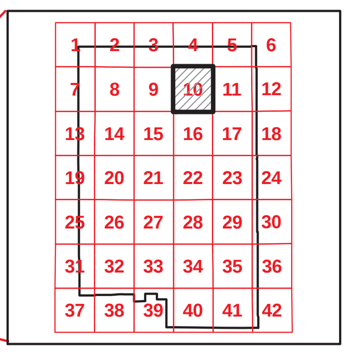




DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

ROSITA NW, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 10 OF 42

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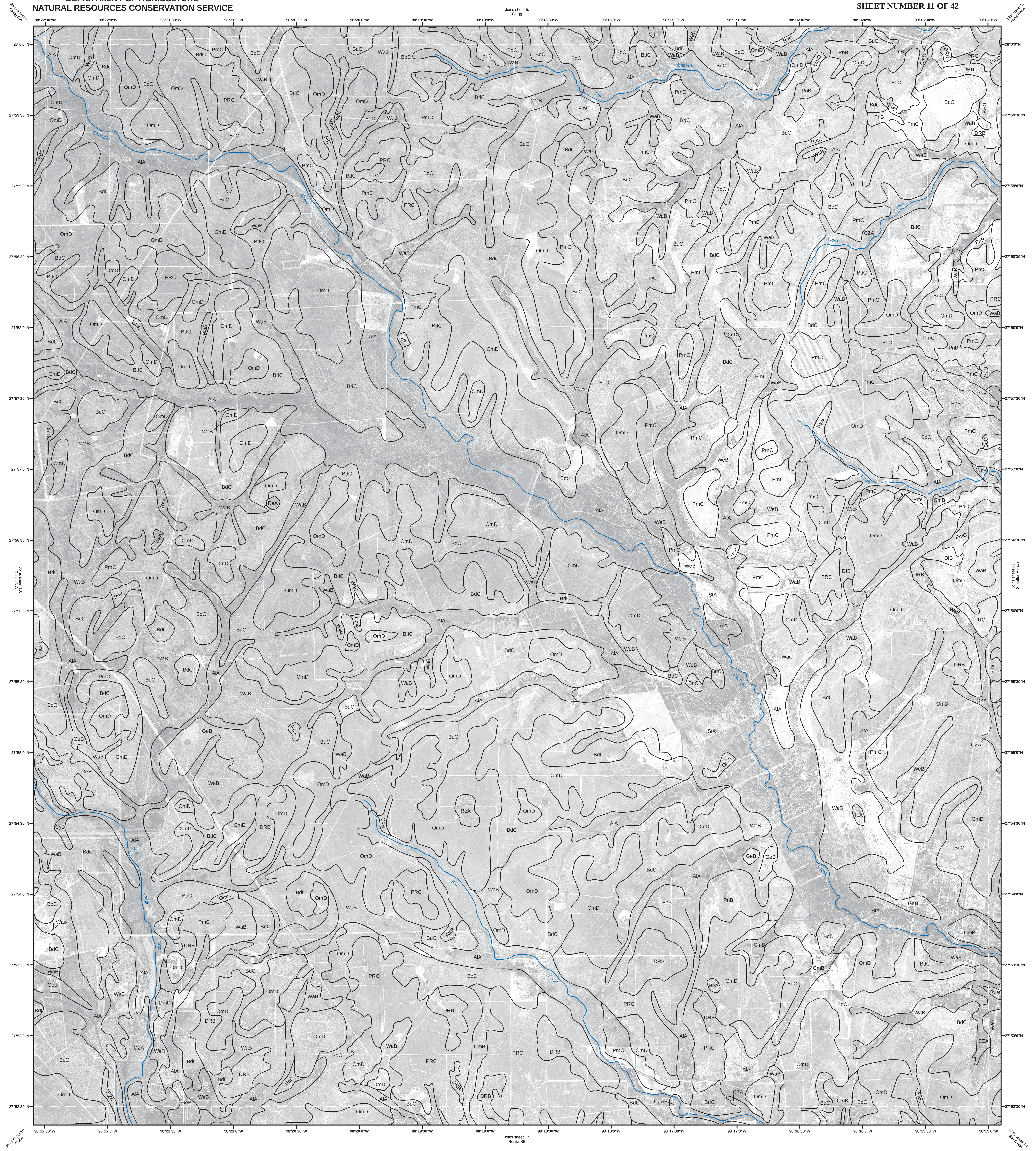
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
ROSITA NE QUADRANGLE
SHEET NUMBER 11 OF 42



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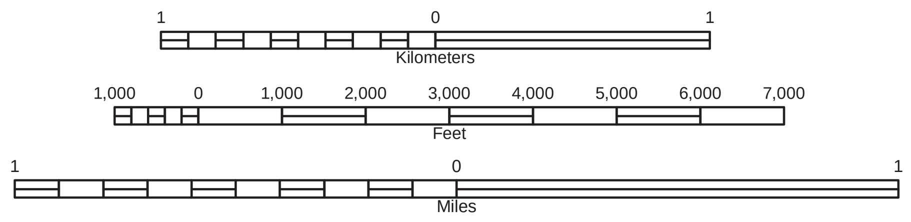
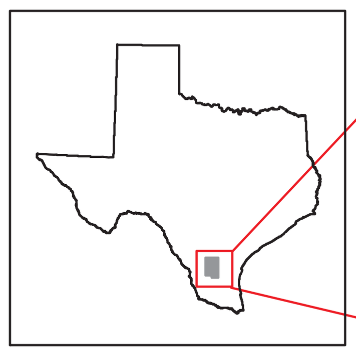
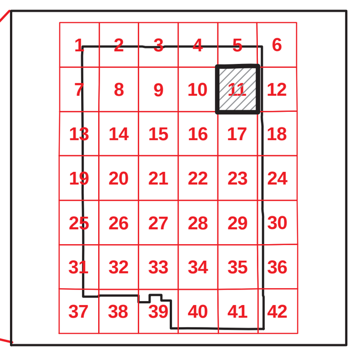




DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

ROSITA NE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 11 OF 42

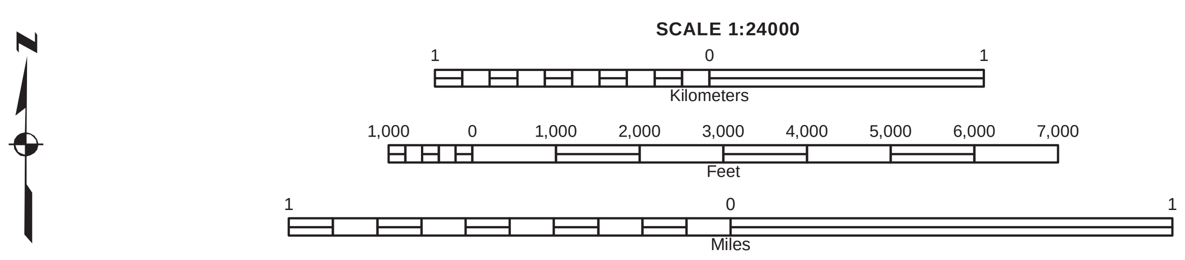
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

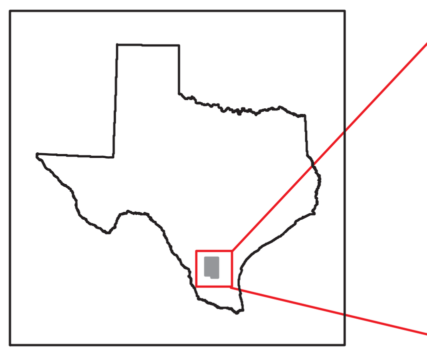
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
SHAEFFER RANCH QUADRANGLE
SHEET NUMBER 12 OF 42

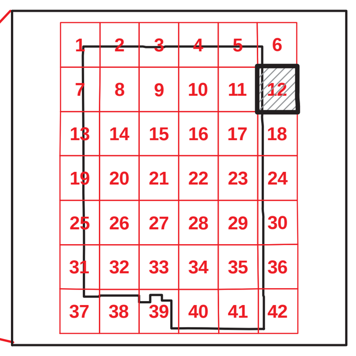
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.





DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

SHAEFFER RANCH, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 12 OF 42

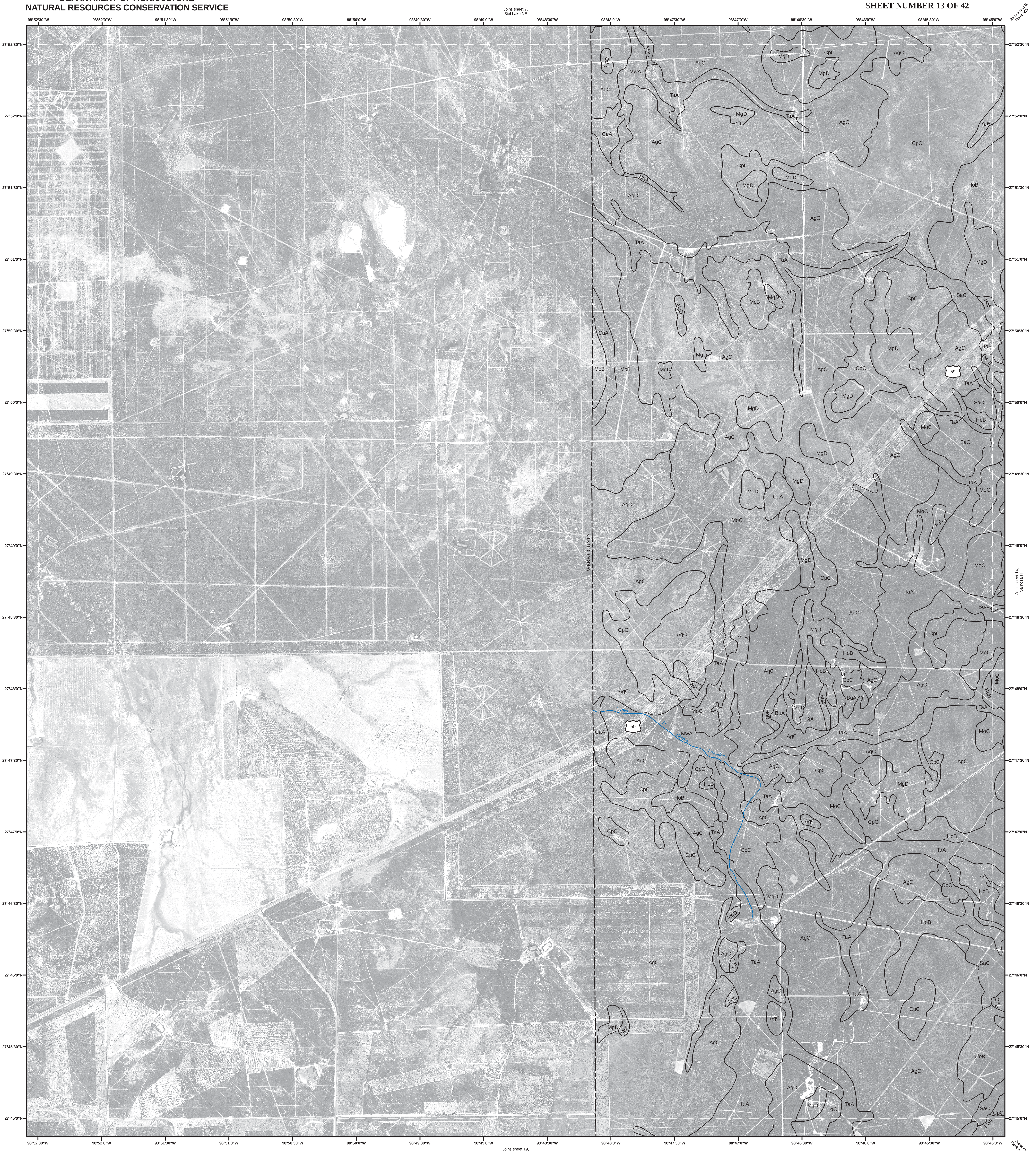
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
BIEL LAKE SE QUADRANGLE
SHEET NUMBER 13 OF 42

Joins sheet 7, Biel Lake NE

Joins sheet 8, Freer NW



Joins sheet 14, Seminole Hill

Joins sheet 19, Mills Bennett

Joins sheet 20, Parrilla Creek NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

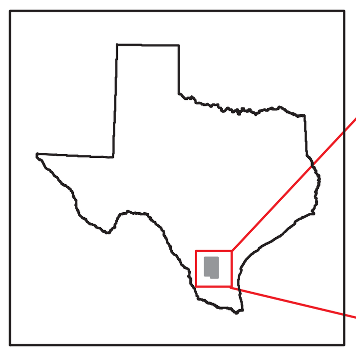
N

SCALE 1:24000

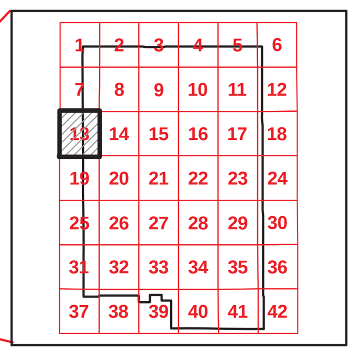
1 0 1
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



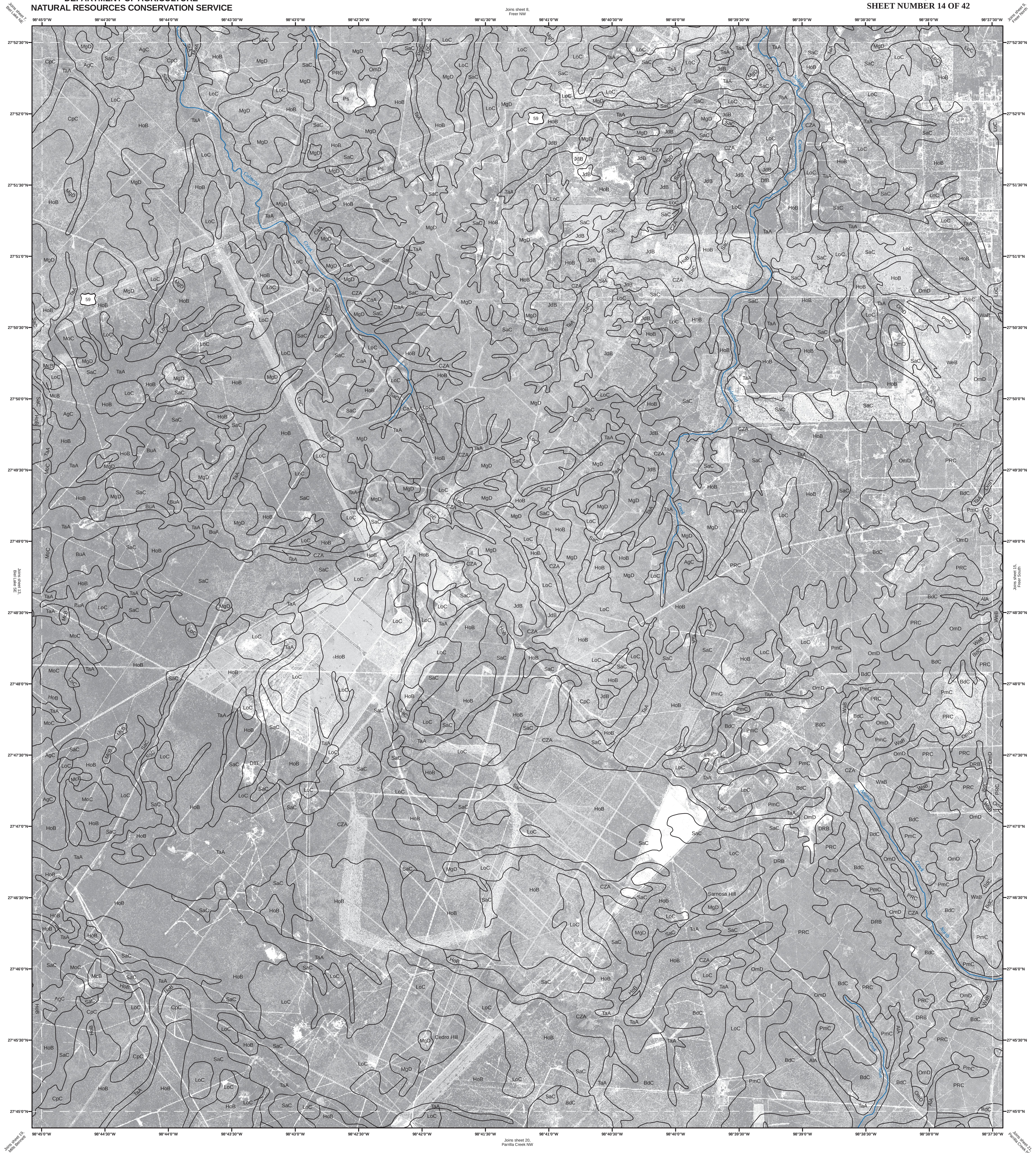
QUADRANGLE LOCATION

BIEL LAKE SE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
SARNOSA HILL QUADRANGLE
SHEET NUMBER 14 OF 42



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

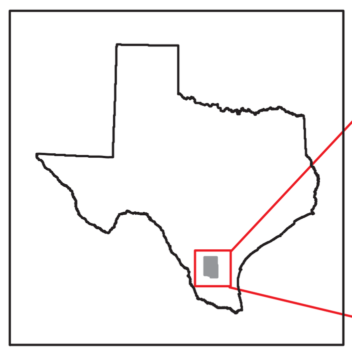
N

SCALE 1:24000

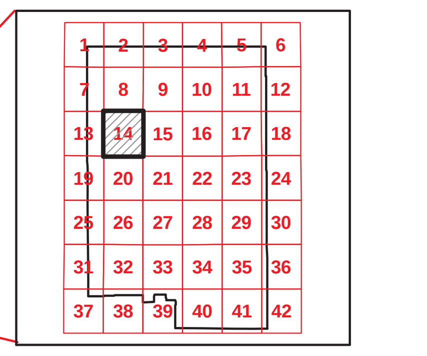
1 0 1
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

SARNOSA HILL, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 14 OF 42

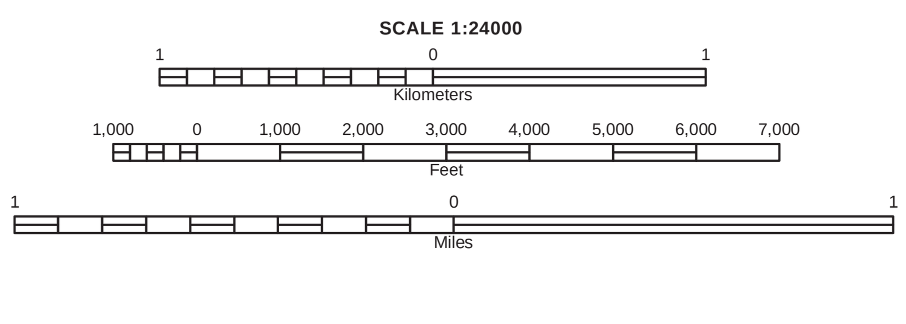
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

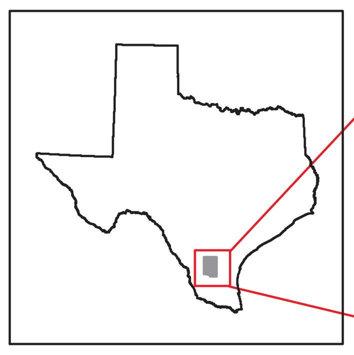
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
FREER SOUTH QUADRANGLE
SHEET NUMBER 15 OF 42

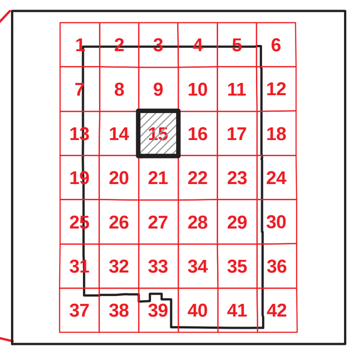
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.





DUVAL COUNTY LOCATION



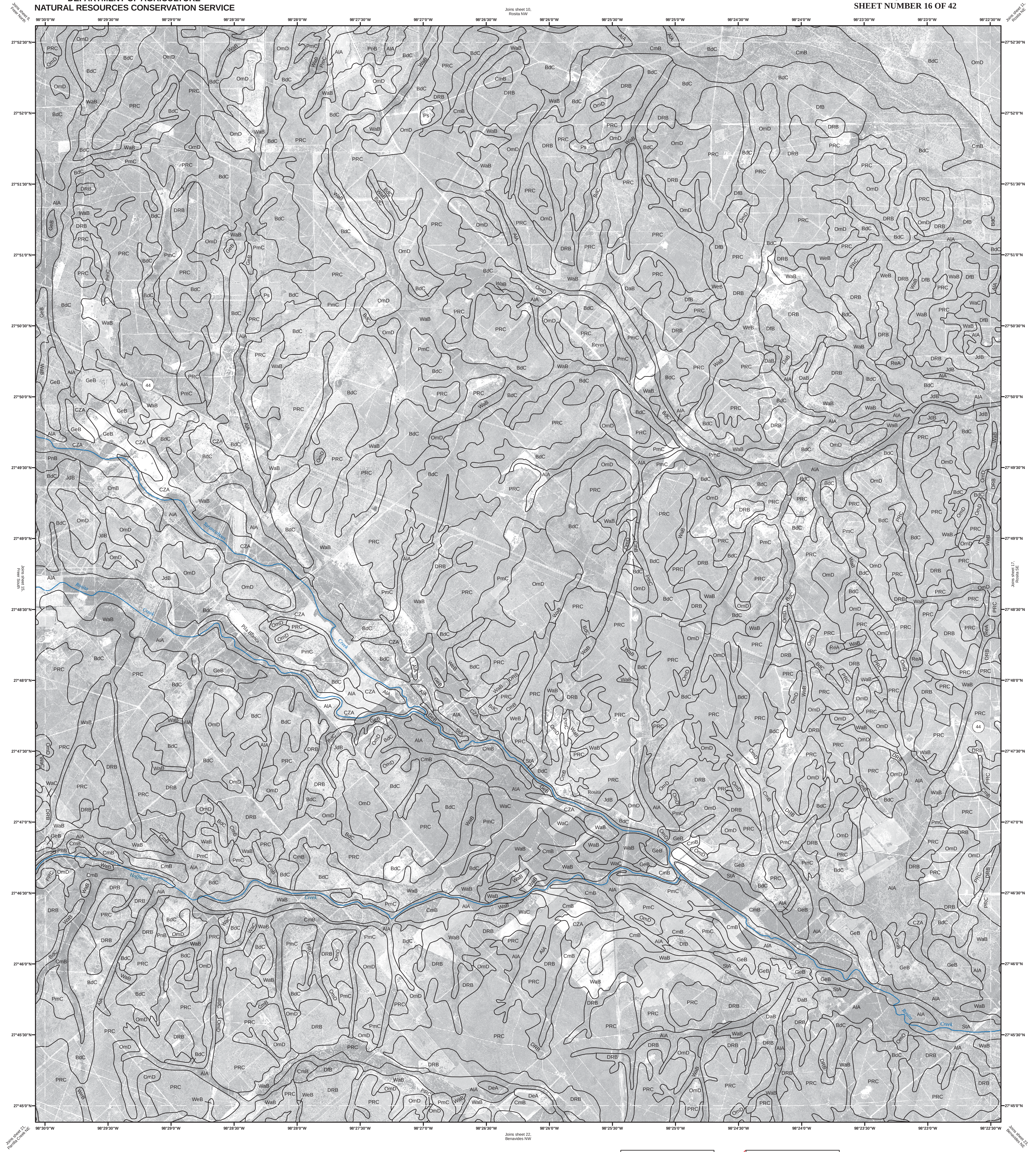
QUADRANGLE LOCATION

FREER SOUTH, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 15 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
ROSITA QUADRANGLE
SHEET NUMBER 16 OF 42



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SCALE 1:24000

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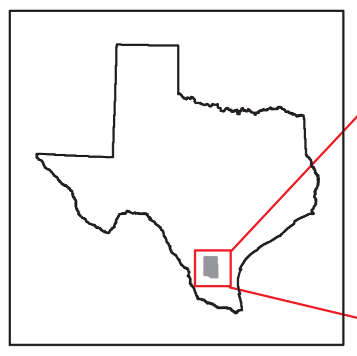
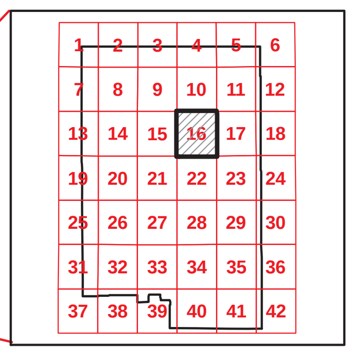
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



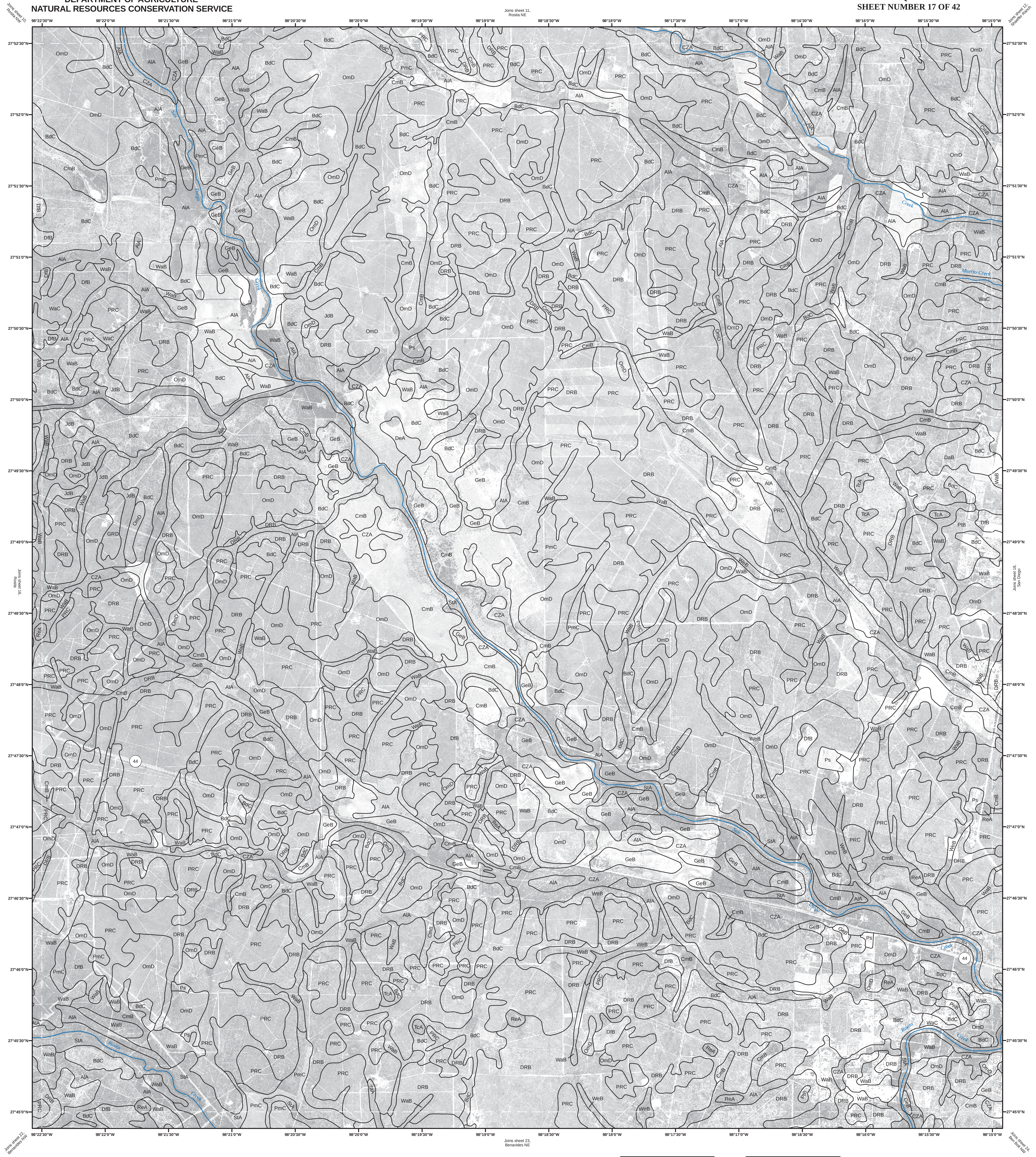
QUADRANGLE LOCATION

ROSITA, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 16 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
ROSITA SE QUADRANGLE
SHEET NUMBER 17 OF 42



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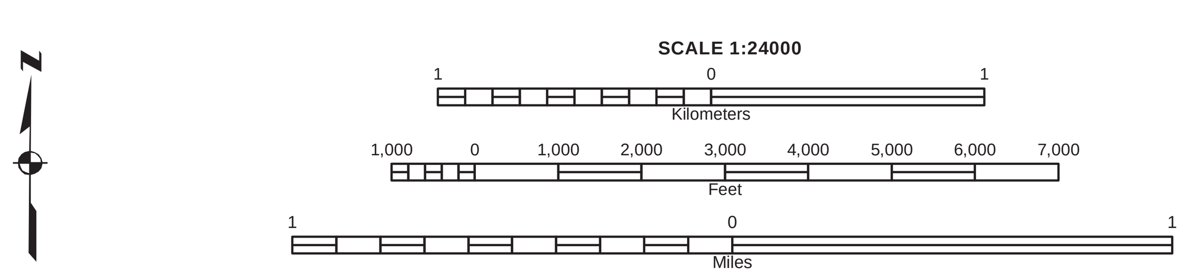
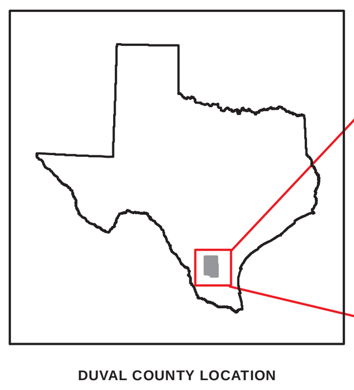
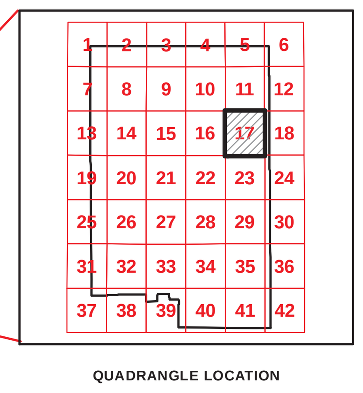
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.







ROSITA SE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 17 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
SAN DIEGO QUADRANGLE
SHEET NUMBER 18 OF 42

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

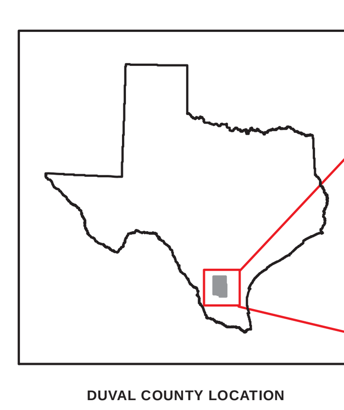
N

SCALE 1:24000

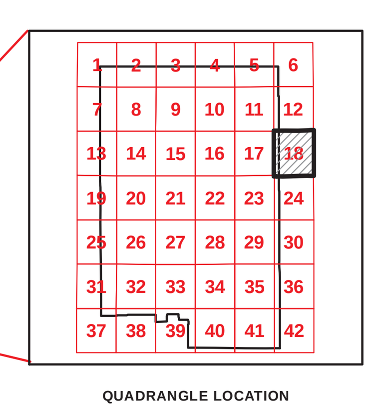
1 0 1
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

SAN DIEGO, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 18 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
MILLS BENNETT QUADRANGLE
SHEET NUMBER 19 OF 42

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

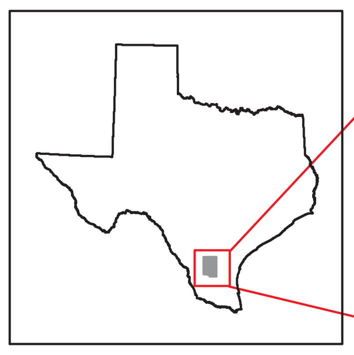
N

SCALE 1:24000

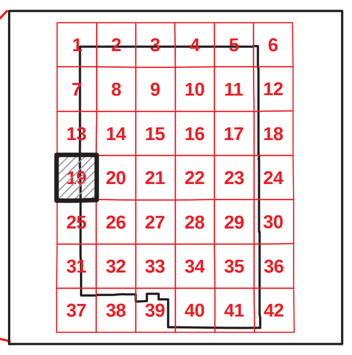
1 0 1
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

MILLS BENNETT, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 19 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
PARRILLA CREEK NW QUADRANGLE
SHEET NUMBER 20 OF 42

Joins sheet 13, Biel Lake SE

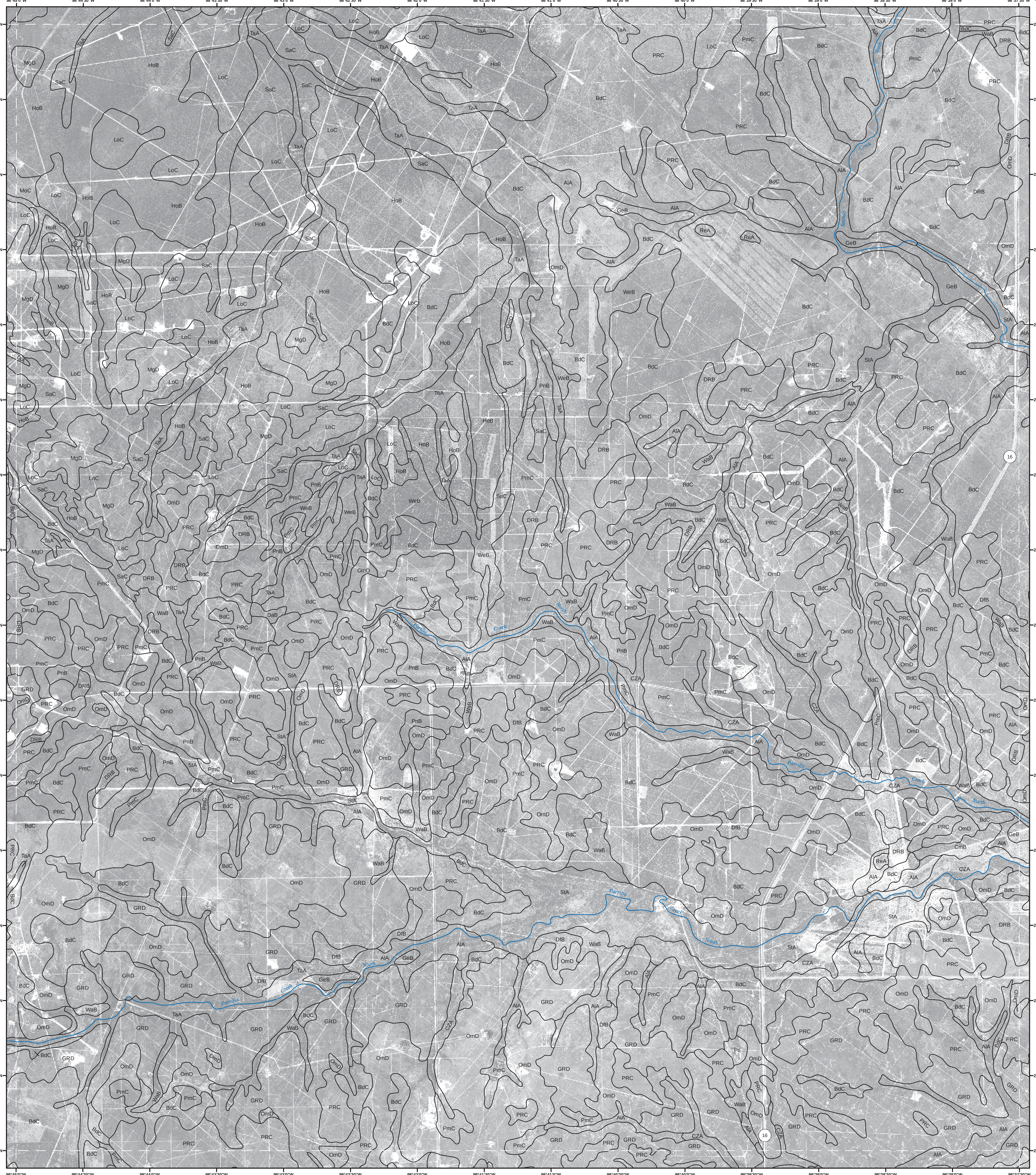
Joins sheet 14, Sarnosa Hill

Joins sheet 15, Freer South

98°45'0"W 98°44'30"W 98°44'0"W 98°43'30"W 98°43'0"W 98°42'30"W 98°42'0"W 98°41'30"W 98°41'0"W 98°40'30"W 98°40'0"W 98°39'30"W 98°39'0"W 98°38'30"W 98°38'0"W 98°37'30"W

27°45'0"N 27°44'30"N 27°44'0"N 27°43'30"N 27°43'0"N 27°42'30"N 27°42'0"N 27°41'30"N 27°41'0"N 27°40'30"N 27°40'0"N 27°39'30"N 27°39'0"N 27°38'30"N 27°38'0"N 27°37'30"N

Joins sheet 19, Mills Bennett



Joins sheet 21, Parrilla Creek NE

Joins sheet 25, San Pablo

Joins sheet 26, Parrilla Creek SW

Joins sheet 27, Parrilla Creek SE

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

SCALE 1:24000

1 0 1
Kilometers

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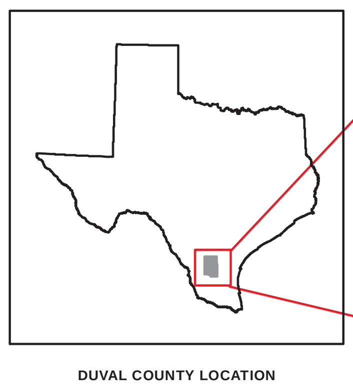
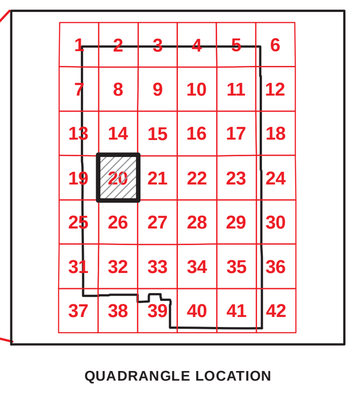
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



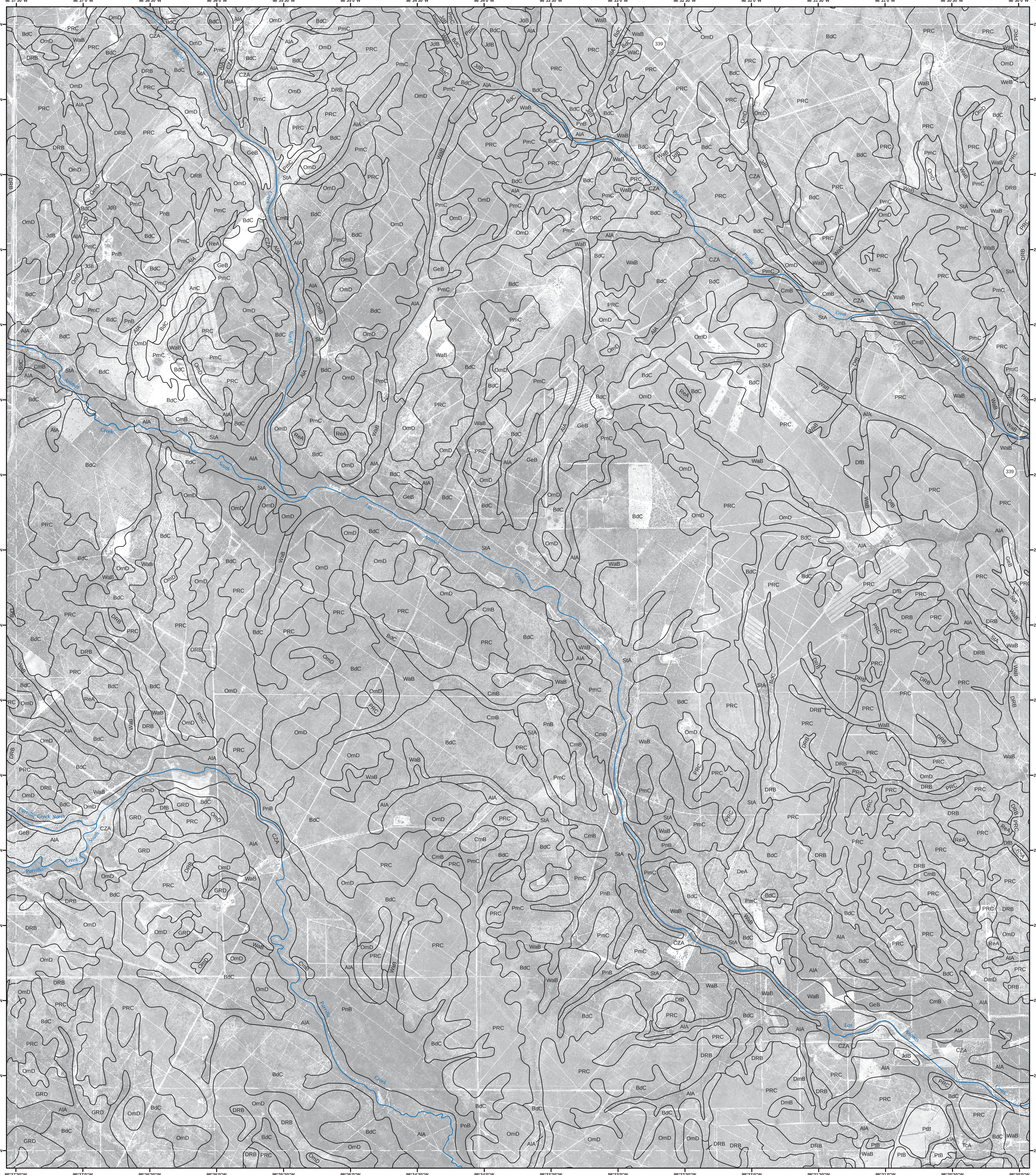
QUADRANGLE LOCATION

PARRILLA CREEK NW, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 20 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
PARRILLA CREEK NE QUADRANGLE
SHEET NUMBER 21 OF 42



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

SCALE 1:24000

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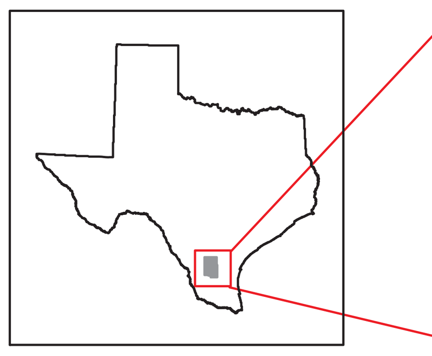
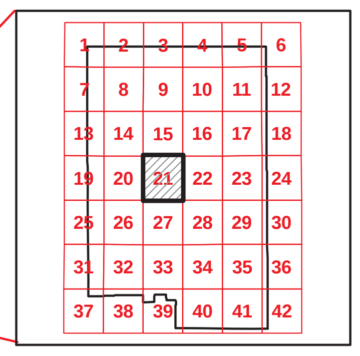
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

PARRILLA CREEK NE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 21 OF 42

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
BENAVIDES NW QUADRANGLE
SHEET NUMBER 22 OF 42

Joins sheet 15, Felix Sosa

Joins sheet 16, Rosita

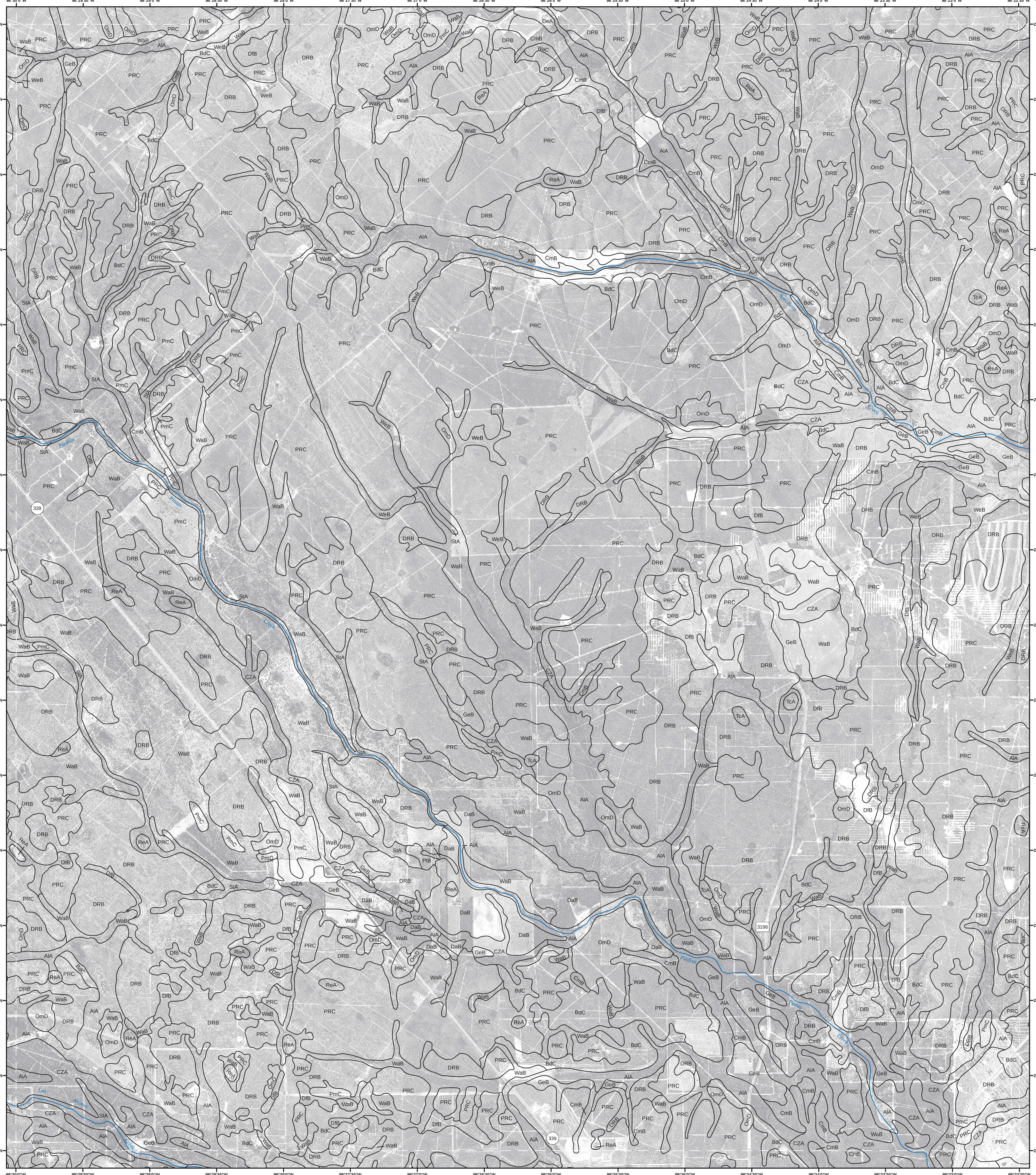
Joins sheet 17, Rosita SE

98°30'0"W 98°29'30"W 98°29'0"W 98°28'30"W 98°28'0"W 98°27'30"W 98°27'0"W 98°26'30"W 98°26'0"W 98°25'30"W 98°25'0"W 98°24'30"W 98°24'0"W 98°23'30"W 98°23'0"W 98°22'30"W

27°45'0"N 27°44'30"N 27°44'0"N 27°43'30"N 27°43'0"N 27°42'30"N 27°42'0"N 27°41'30"N 27°41'0"N 27°40'30"N 27°40'0"N 27°39'30"N 27°39'0"N 27°38'30"N 27°38'0"N 27°37'30"N

Joins sheet 21, Parrilla Creek NE

Joins sheet 23, Benavides NE



Joins sheet 27, Parrilla Creek SE

Joins sheet 28, Benavides

Joins sheet 29, San Jose

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

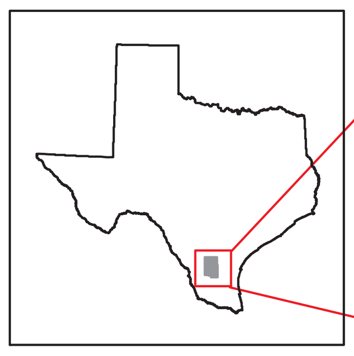
N

SCALE 1:24000

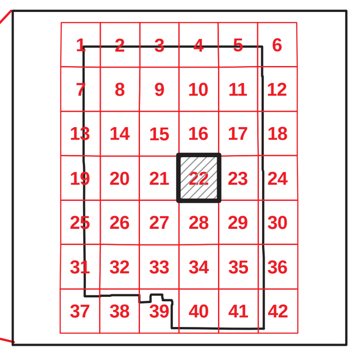
1 0 1
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

BENAVIDES NW, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 22 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
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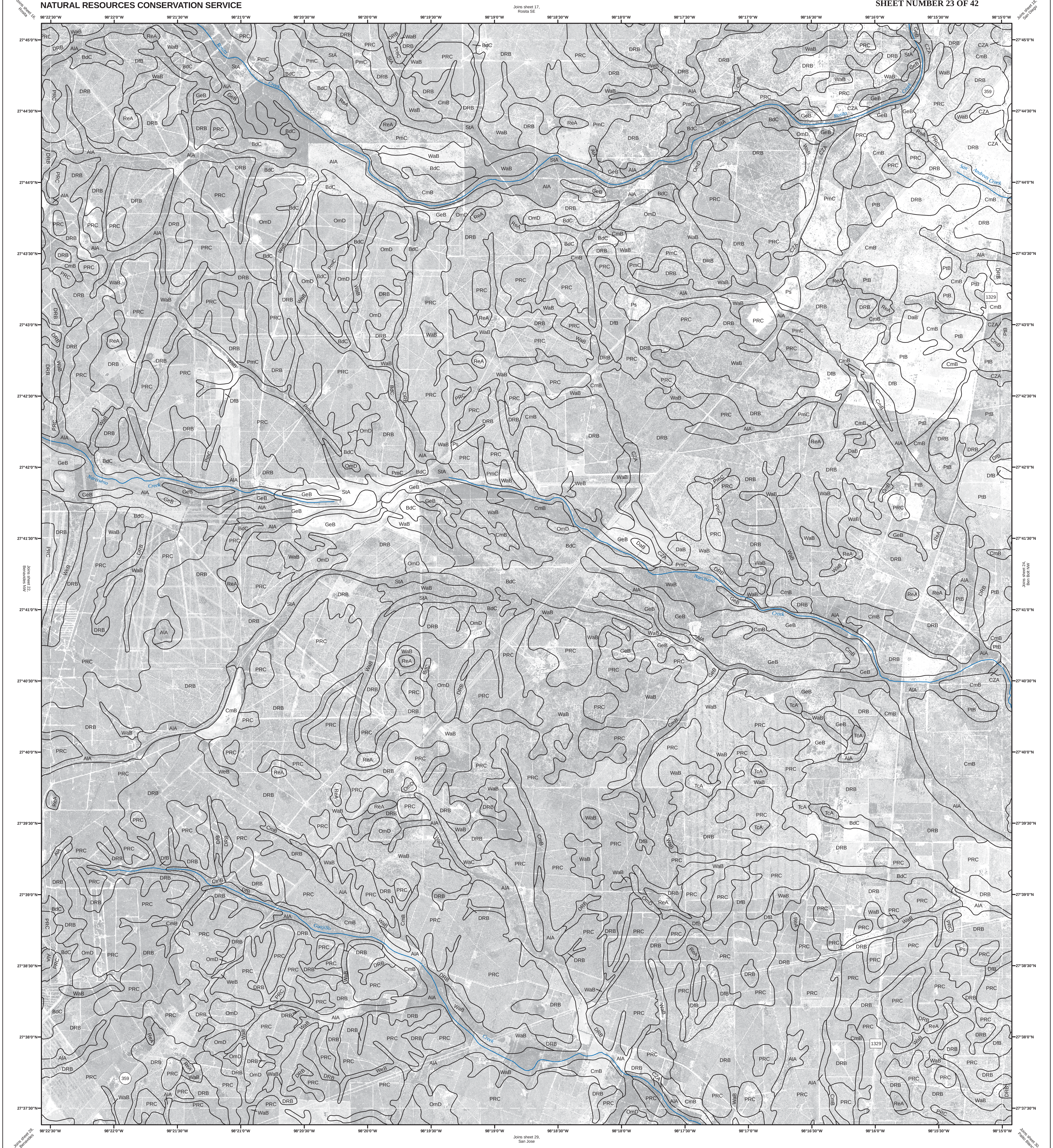
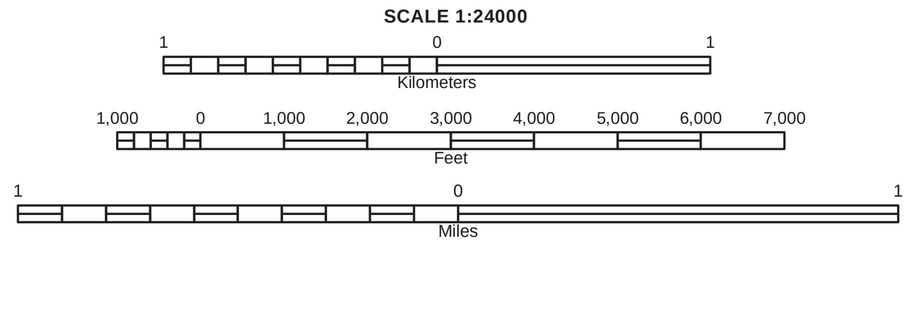
NATURAL RESOURCES CONSERVATION SERVICE

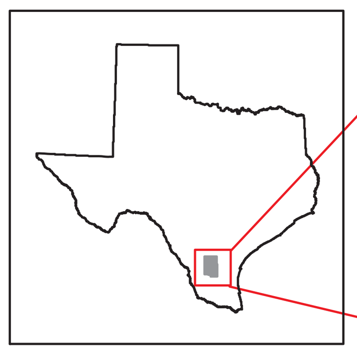
DUVAL COUNTY, TEXAS
BENAVIDES NE QUADRANGLE
SHEET NUMBER 23 OF 42



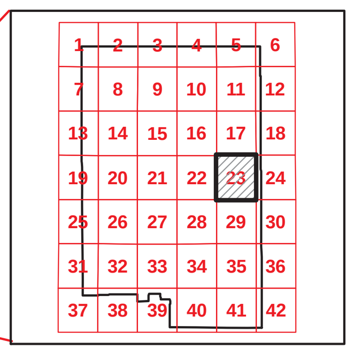
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.





DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

BENAVIDES NE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 23 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

SCALE 1:24000

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Kilometers

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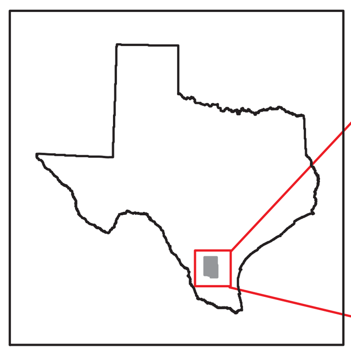
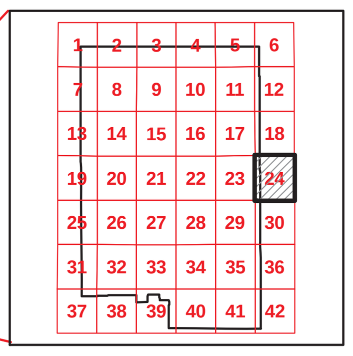
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

BEN BOLT NW, TEXAS

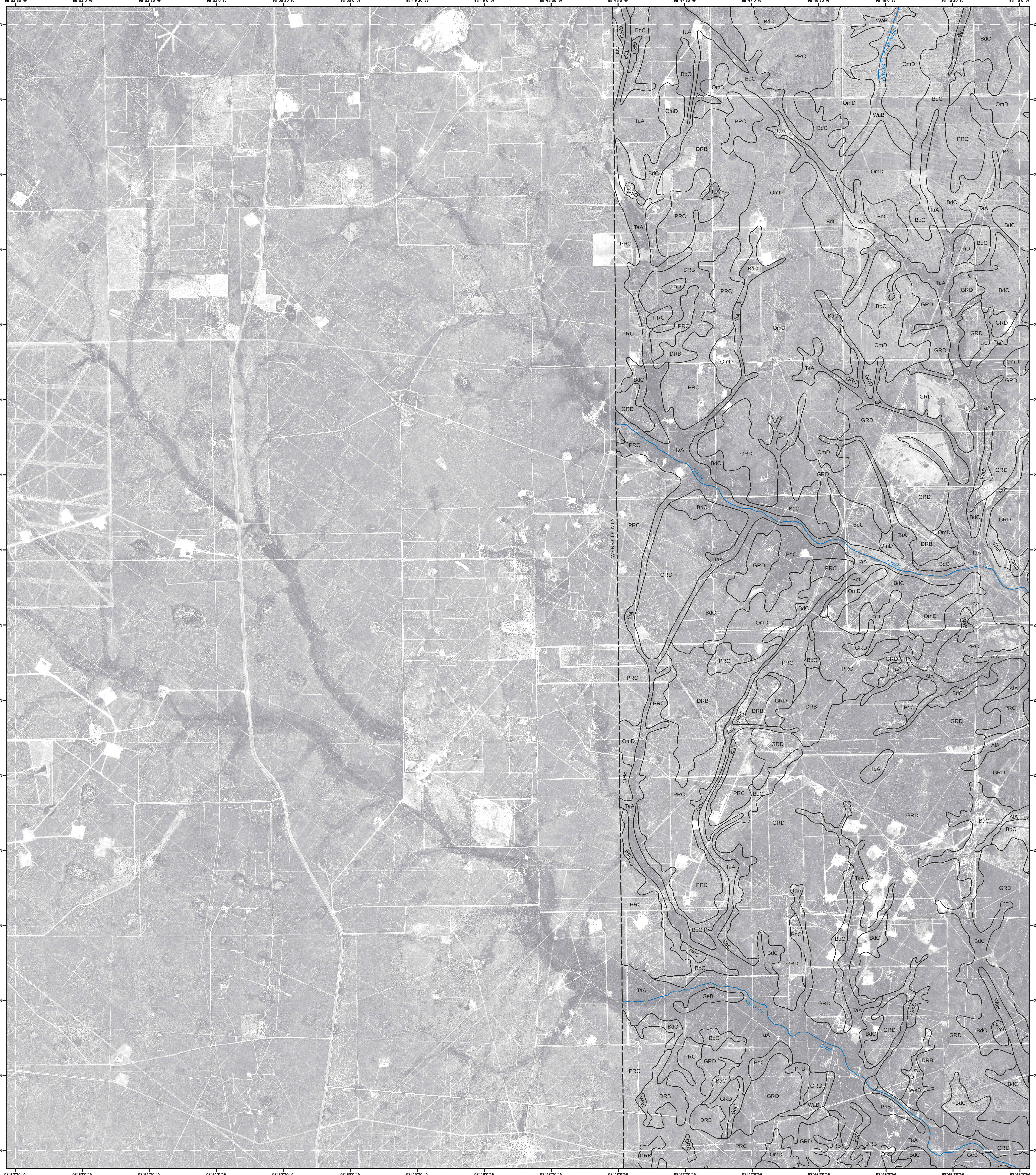
7.5 MINUTE SERIES

SHEET NUMBER 24 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
SAN PABLO QUADRANGLE
SHEET NUMBER 25 OF 42



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

SCALE 1:24000

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Kilometers

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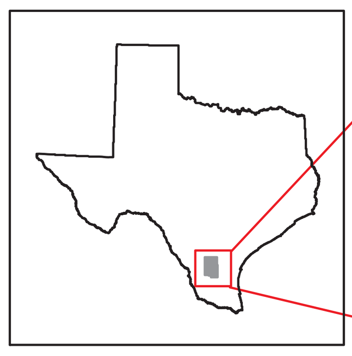
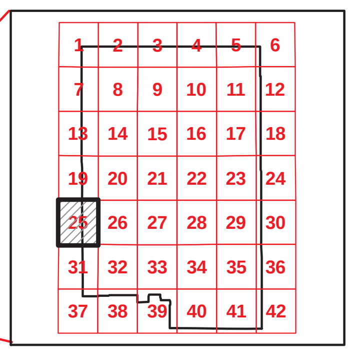
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

SAN PABLO, TEXAS

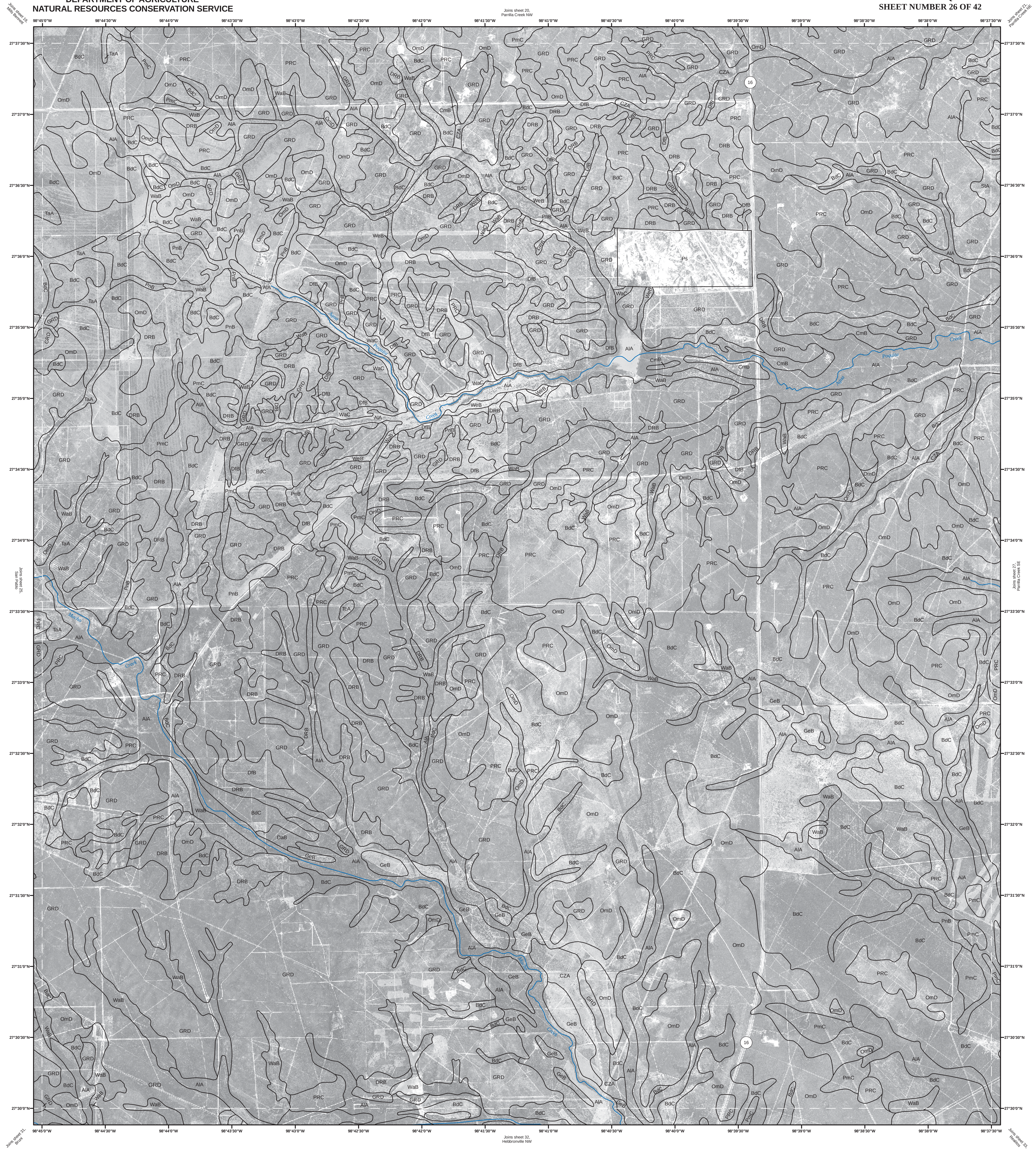
7.5 MINUTE SERIES

SHEET NUMBER 25 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
PARRILLA CREEK SW QUADRANGLE
SHEET NUMBER 26 OF 42



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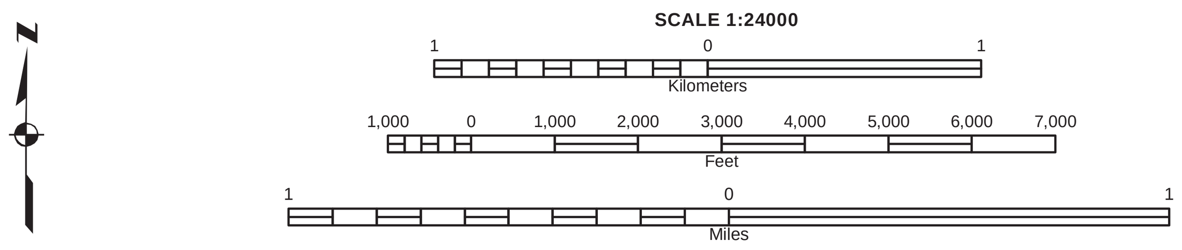
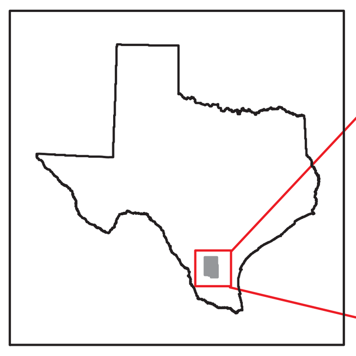
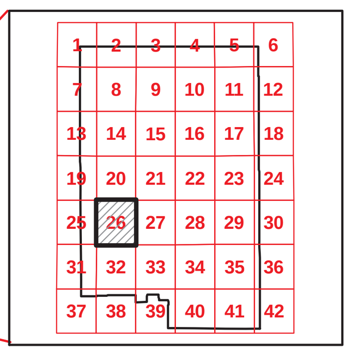
North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.





DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

PARRILLA CREEK SW, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 26 OF 42

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
PARRILLA CREEK SE QUADRANGLE
SHEET NUMBER 27 OF 42

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

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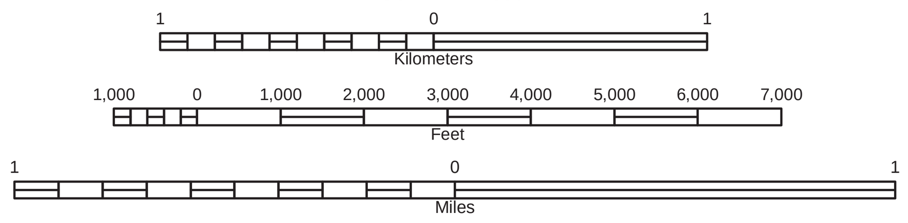
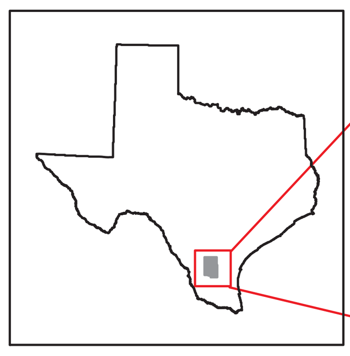
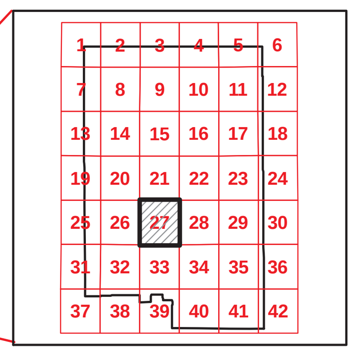




DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

PARRILLA CREEK SE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 27 OF 42

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
BENAVIDES QUADRANGLE
SHEET NUMBER 28 OF 42

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

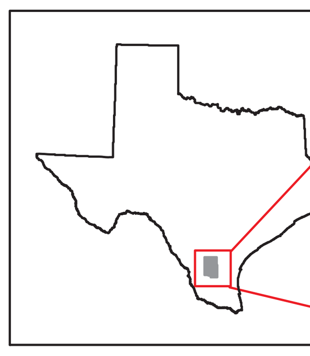
N

SCALE 1:24000

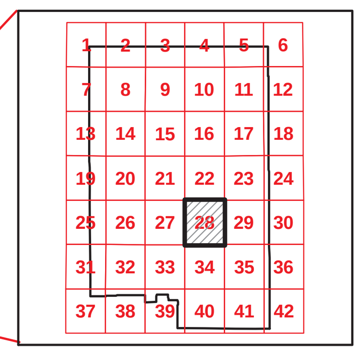
1 0 1
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

BENAVIDES, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 28 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
SAN JOSE QUADRANGLE
SHEET NUMBER 29 OF 42

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

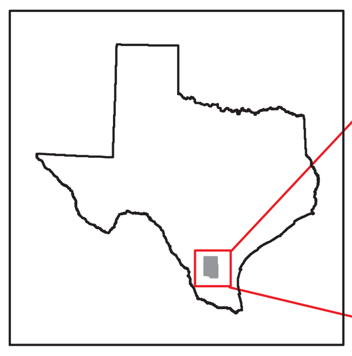
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SCALE 1:24000

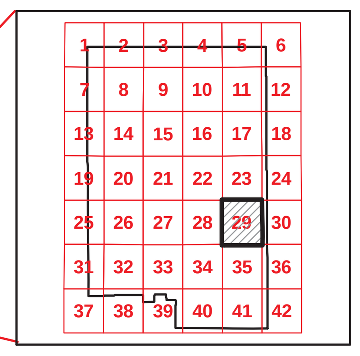
Kilometers

Feet

Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

SAN JOSE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 29 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

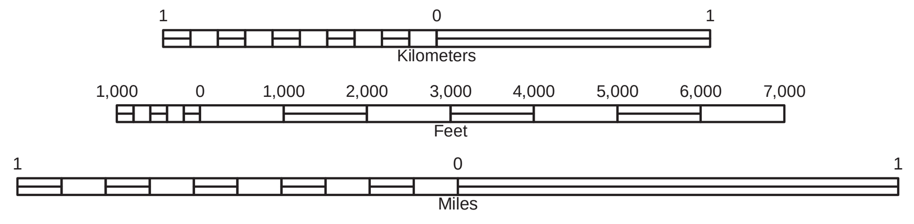
DUVAL COUNTY, TEXAS
PALITO BLANCO QUADRANGLE
SHEET NUMBER 30 OF 42

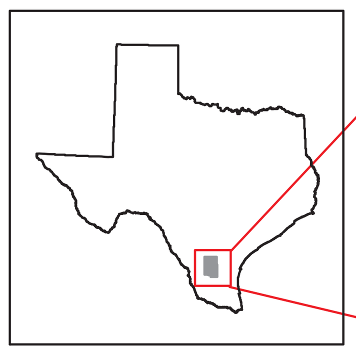
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

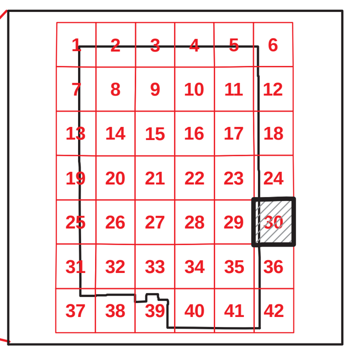
N

SCALE 1:24000





DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

PALITO BLANCO, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 30 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

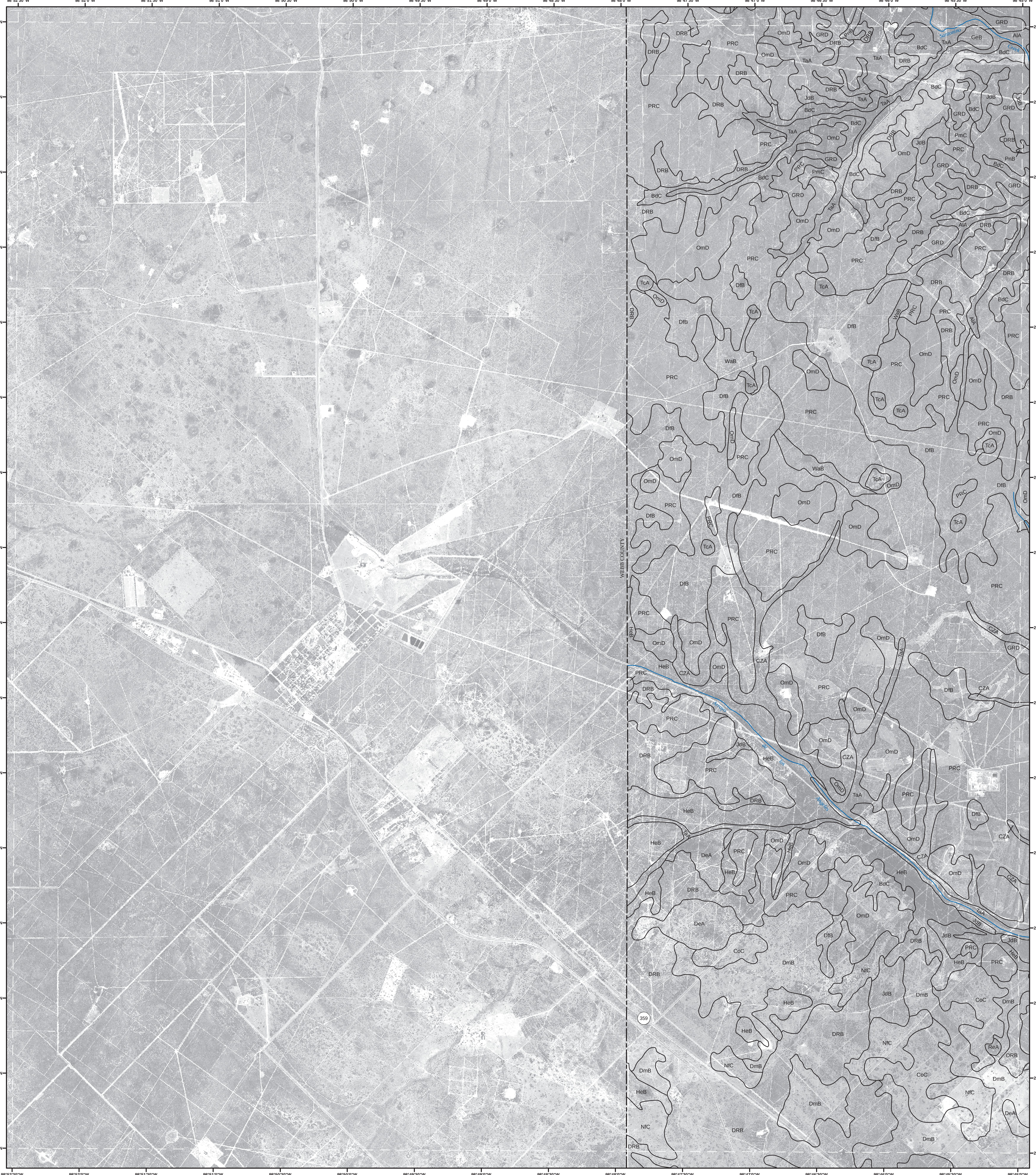
DUVAL COUNTY, TEXAS
BRUNI QUADRANGLE
SHEET NUMBER 31 OF 42

Joins sheet 25, San Pablo

Joins sheet 26, Parrilla Creek SW

98°52'30"W 98°52'0"W 98°51'30"W 98°51'0"W 98°50'30"W 98°50'0"W 98°49'30"W 98°49'0"W 98°48'30"W 98°48'0"W 98°47'30"W 98°47'0"W 98°46'30"W 98°46'0"W 98°45'30"W 98°45'0"W

27°30'0"N 27°29'30"N 27°29'0"N 27°28'30"N 27°28'0"N 27°27'30"N 27°27'0"N 27°26'30"N 27°26'0"N 27°25'30"N 27°25'0"N 27°24'30"N 27°24'0"N 27°23'30"N 27°23'0"N 27°22'30"N



Joins sheet 32, Hebbronville NW

Joins sheet 37, Bruni SE

Joins sheet 38, Hebbronville

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SCALE 1:24000

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Kilometers

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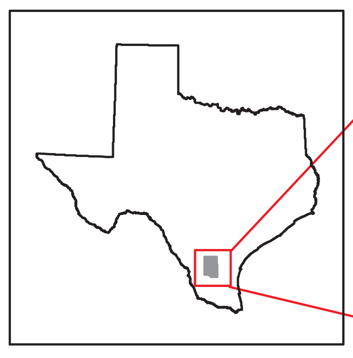
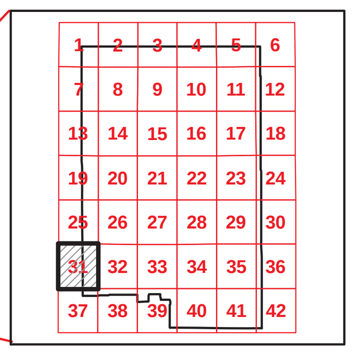
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

BRUNI, TEXAS

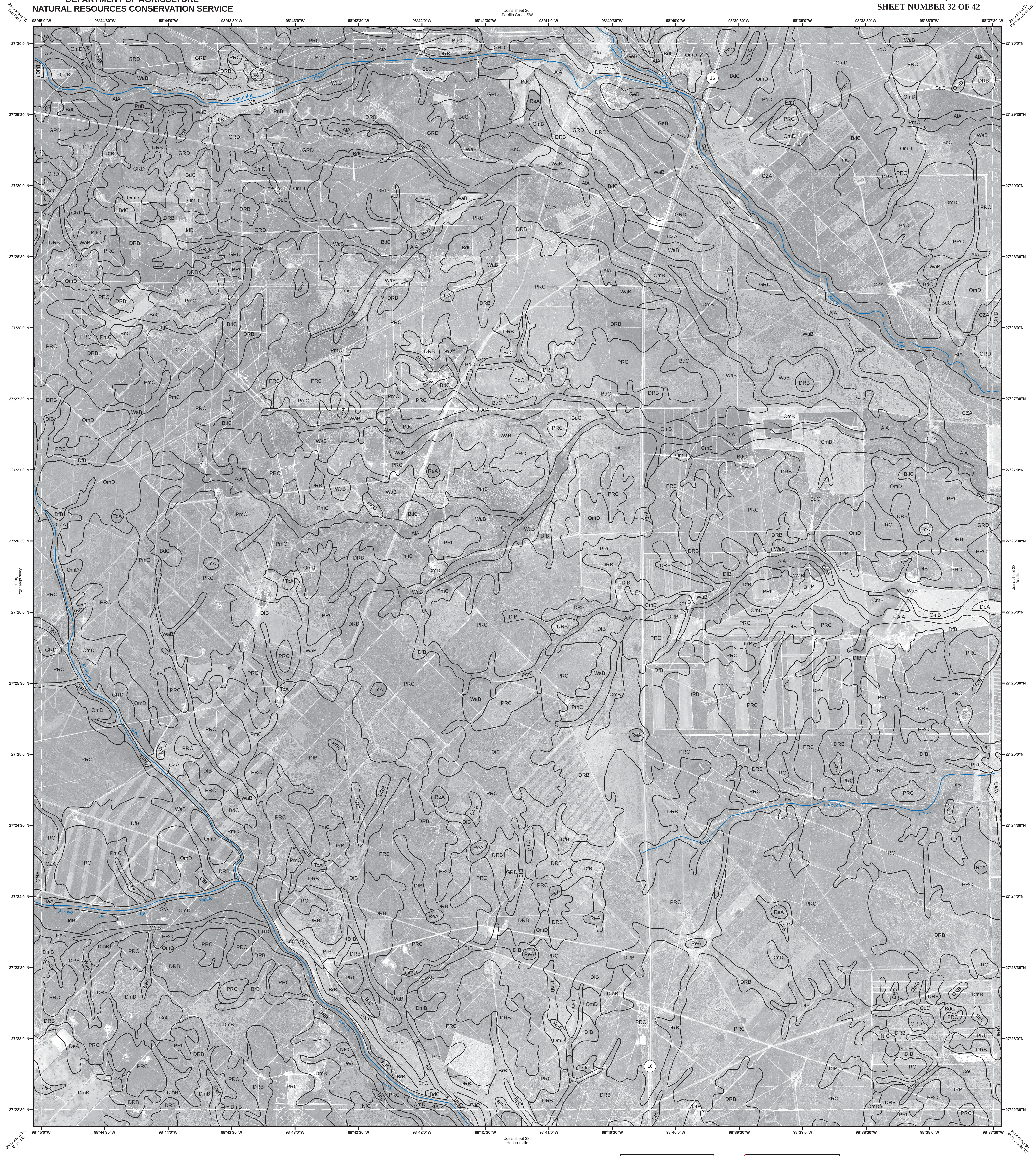
7.5 MINUTE SERIES

SHEET NUMBER 31 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
HEBBRONVILLE NW QUADRANGLE
SHEET NUMBER 32 OF 42



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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
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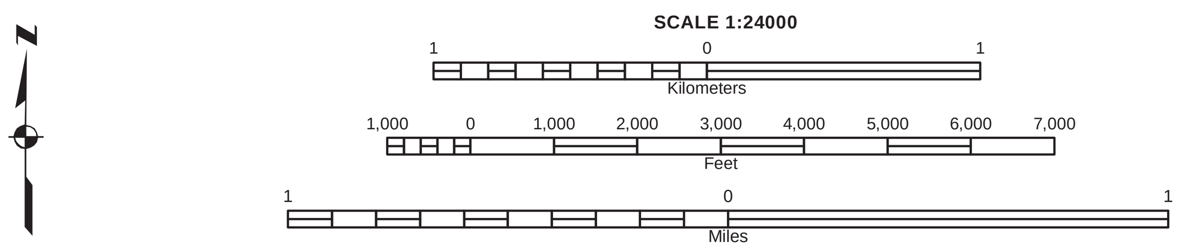
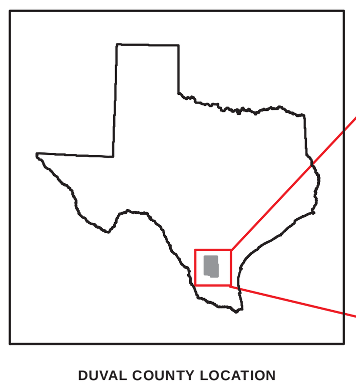
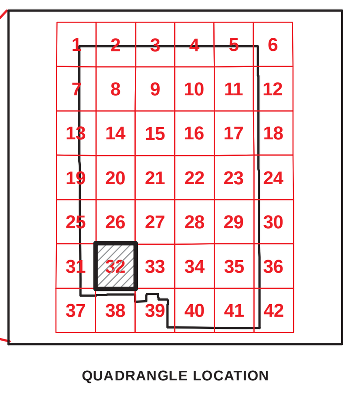



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

HEBBRONVILLE NW, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 32 OF 42

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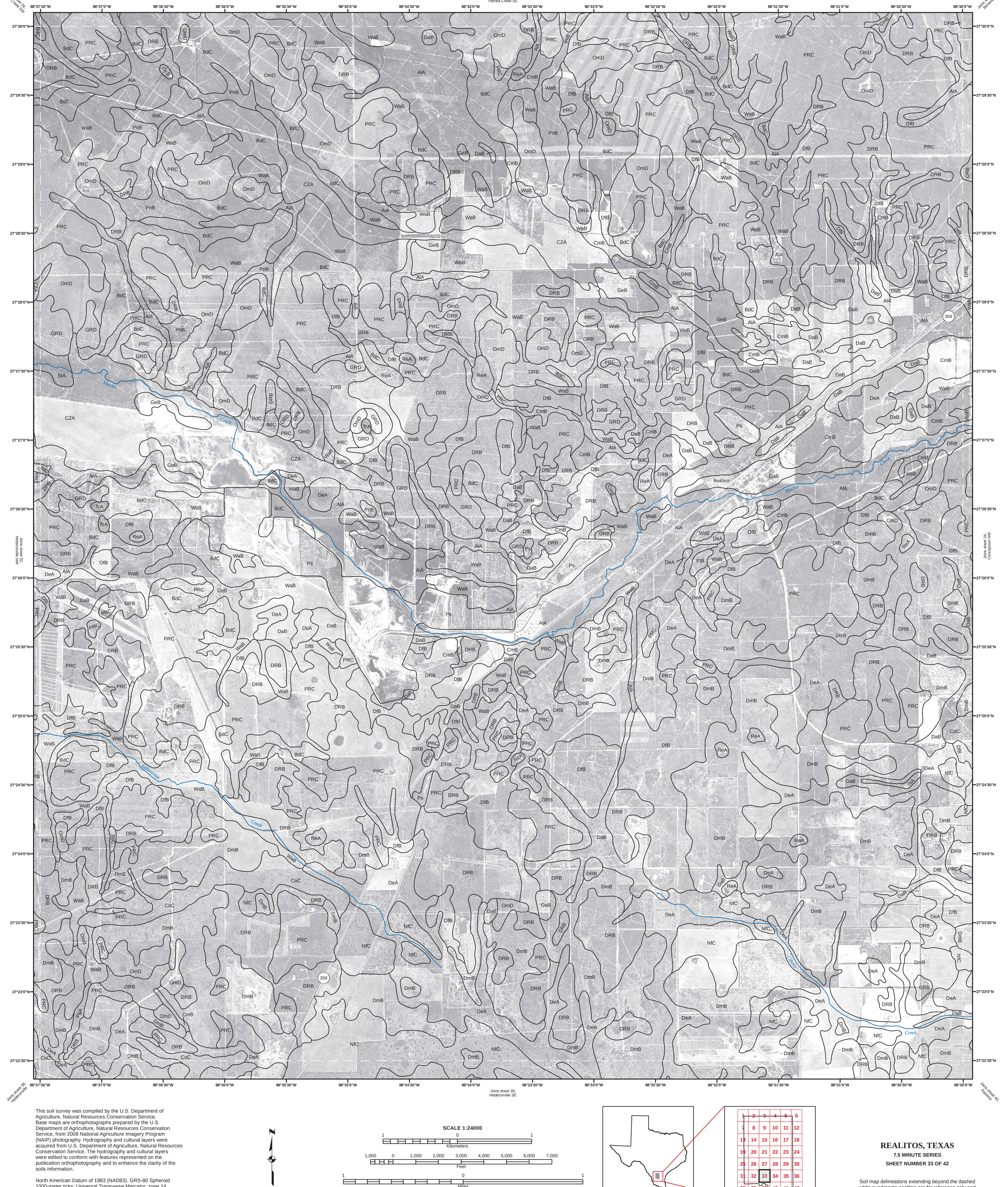
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
REALITOS QUADRANGLE
SHEET NUMBER 33 OF 42



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

REALITOS, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 33 OF 42

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
CONCEPCION NW QUADRANGLE
SHEET NUMBER 34 OF 42

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

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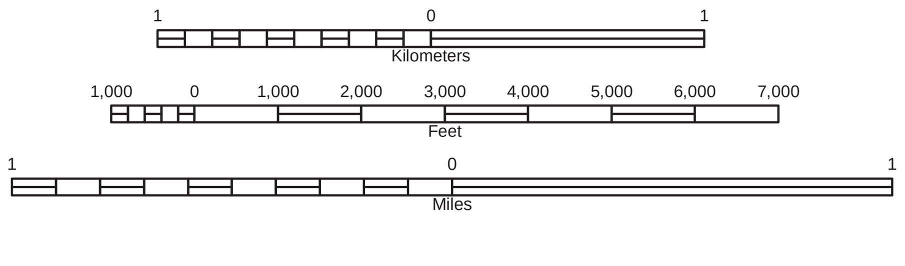
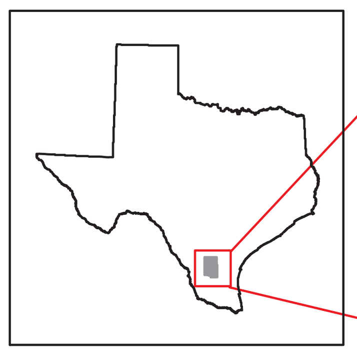
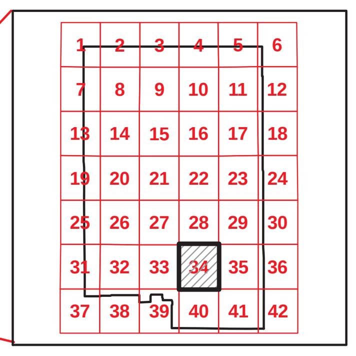




DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

CONCEPCION NW, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 34 OF 42

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
CONCEPCION QUADRANGLE
SHEET NUMBER 35 OF 42

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

SCALE 1:24000

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Kilometers

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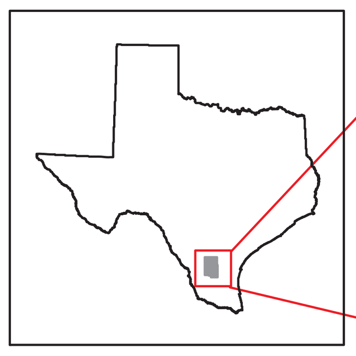
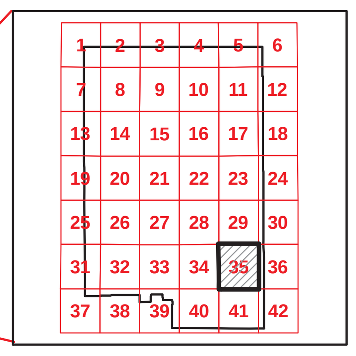
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

CONCEPCION, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 35 OF 42

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
SEELIGSON RANCH QUADRANGLE
SHEET NUMBER 36 OF 42

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, from 2008 National Agriculture Imagery Program (NAIP) photography. Hydrography and cultural layers were acquired from U.S. Department of Agriculture, Natural Resources Conservation Service. The hydrography and cultural layers were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

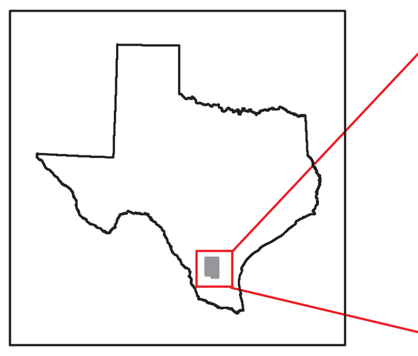
N

SCALE 1:24000

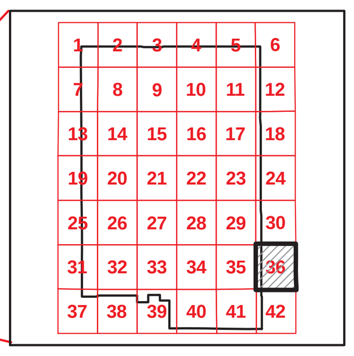
1 0 1
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

SEELIGSON RANCH, TEXAS

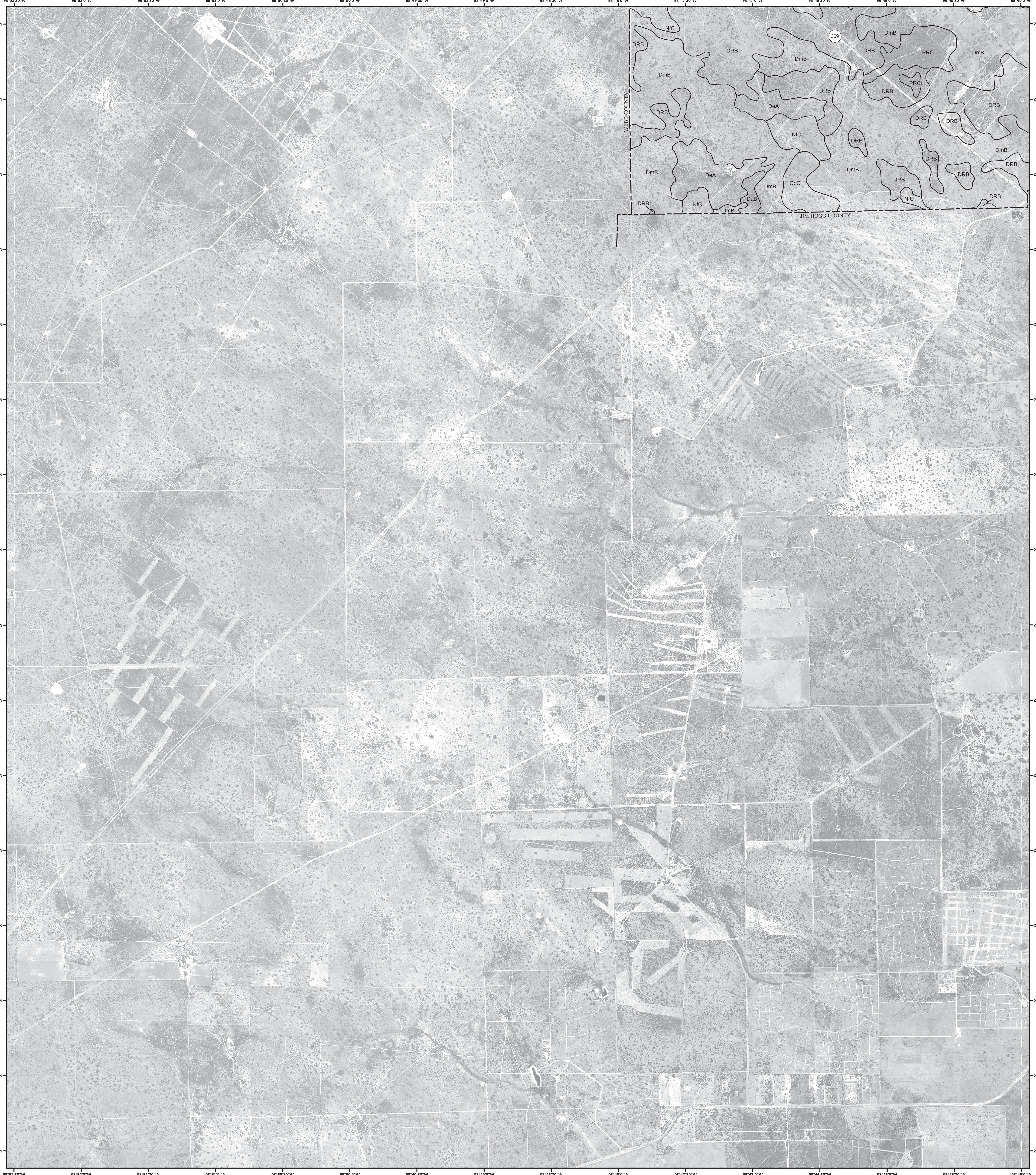
7.5 MINUTE SERIES

SHEET NUMBER 36 OF 42

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on the adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
BRUNI SE QUADRANGLE
SHEET NUMBER 37 OF 42



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

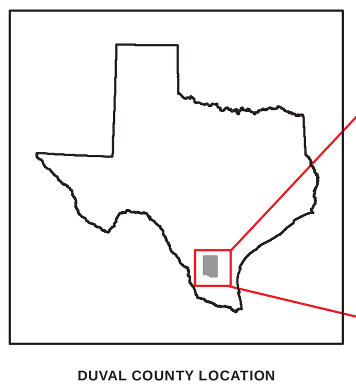
N

SCALE 1:24000

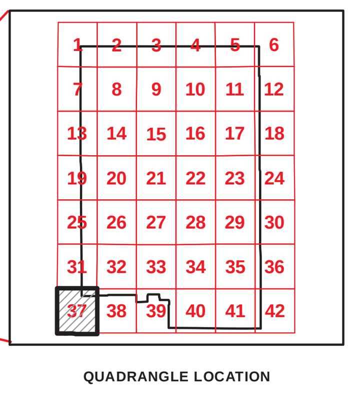
1 0 1
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

BRUNI SE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 37 OF 42

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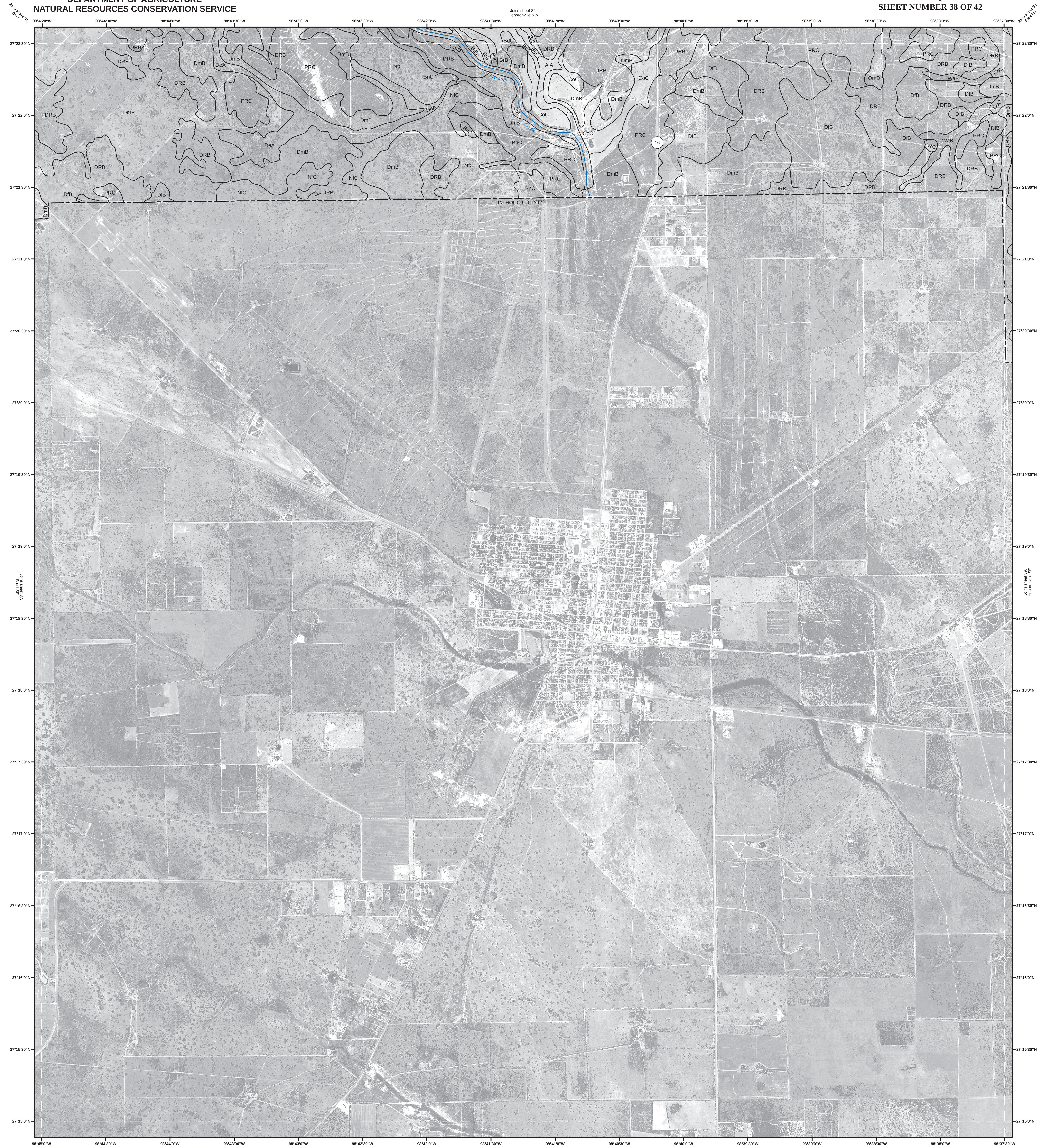
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
HEBBRONVILLE QUADRANGLE
SHEET NUMBER 38 OF 42



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

N

SCALE 1:24000

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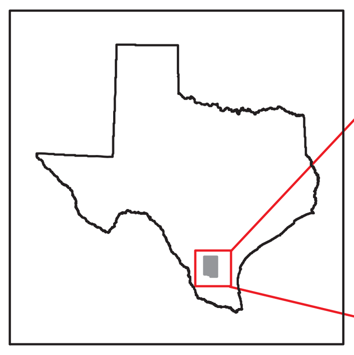
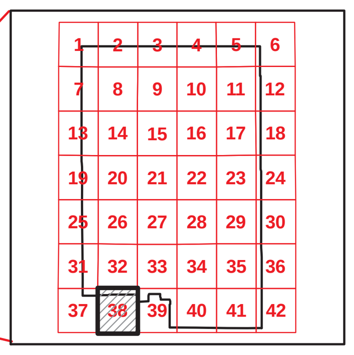
Kilometers

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000
Feet

1 0 1
Miles



DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

HEBBRONVILLE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 38 OF 42

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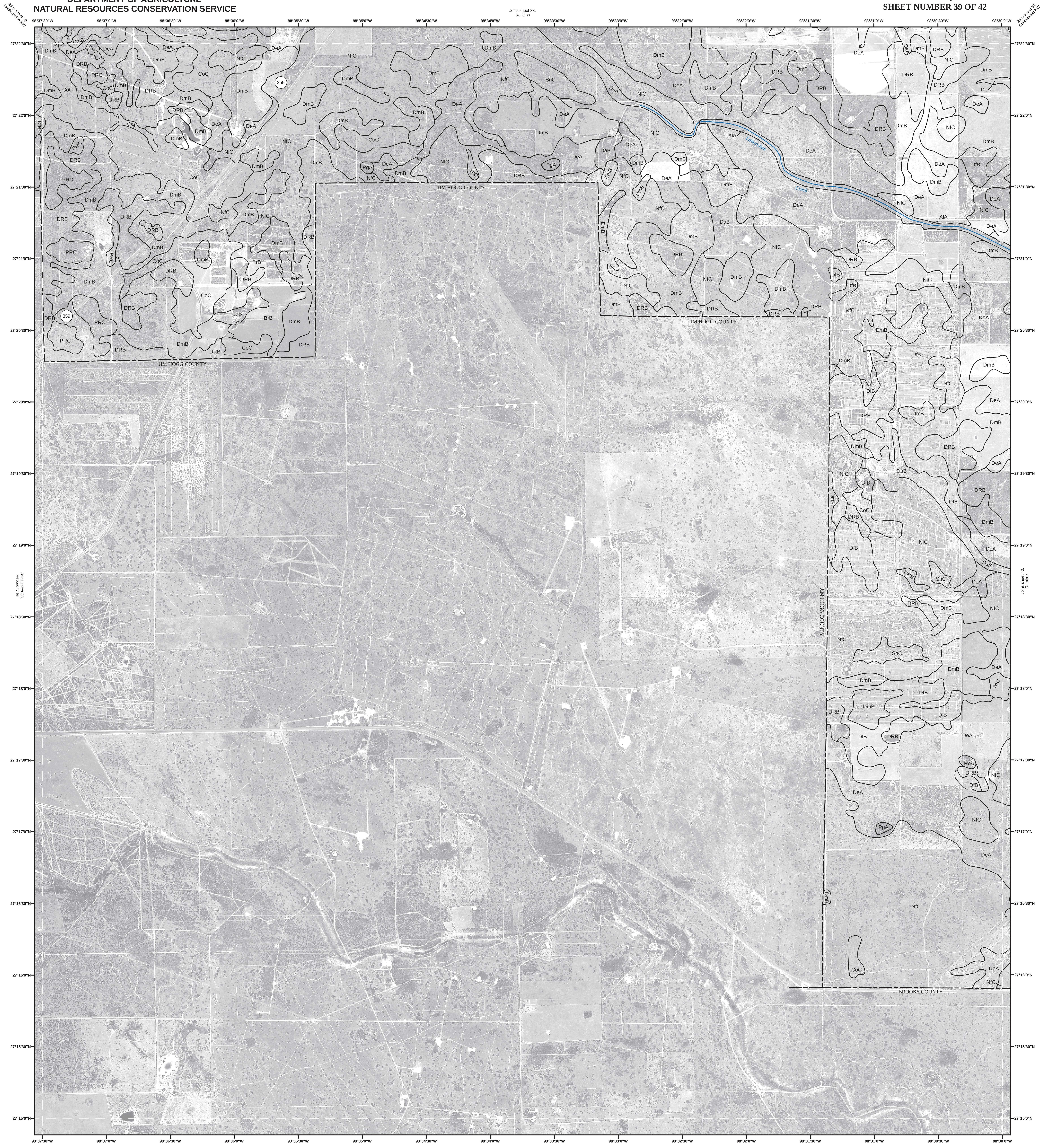
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
HEBBRONVILLE SE QUADRANGLE
SHEET NUMBER 39 OF 42



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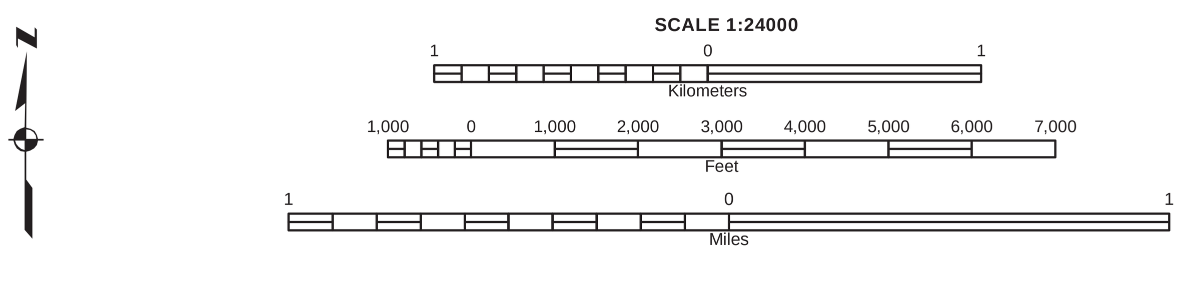
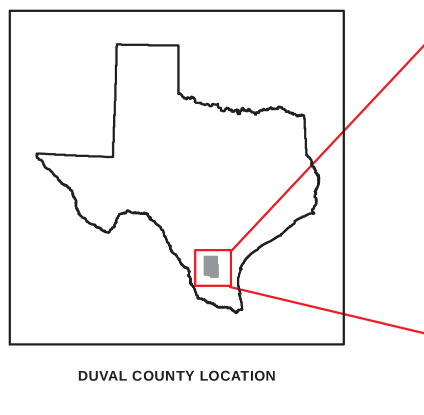
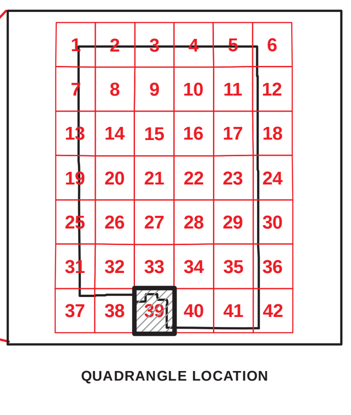




DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

HEBBRONVILLE SE, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 39 OF 42

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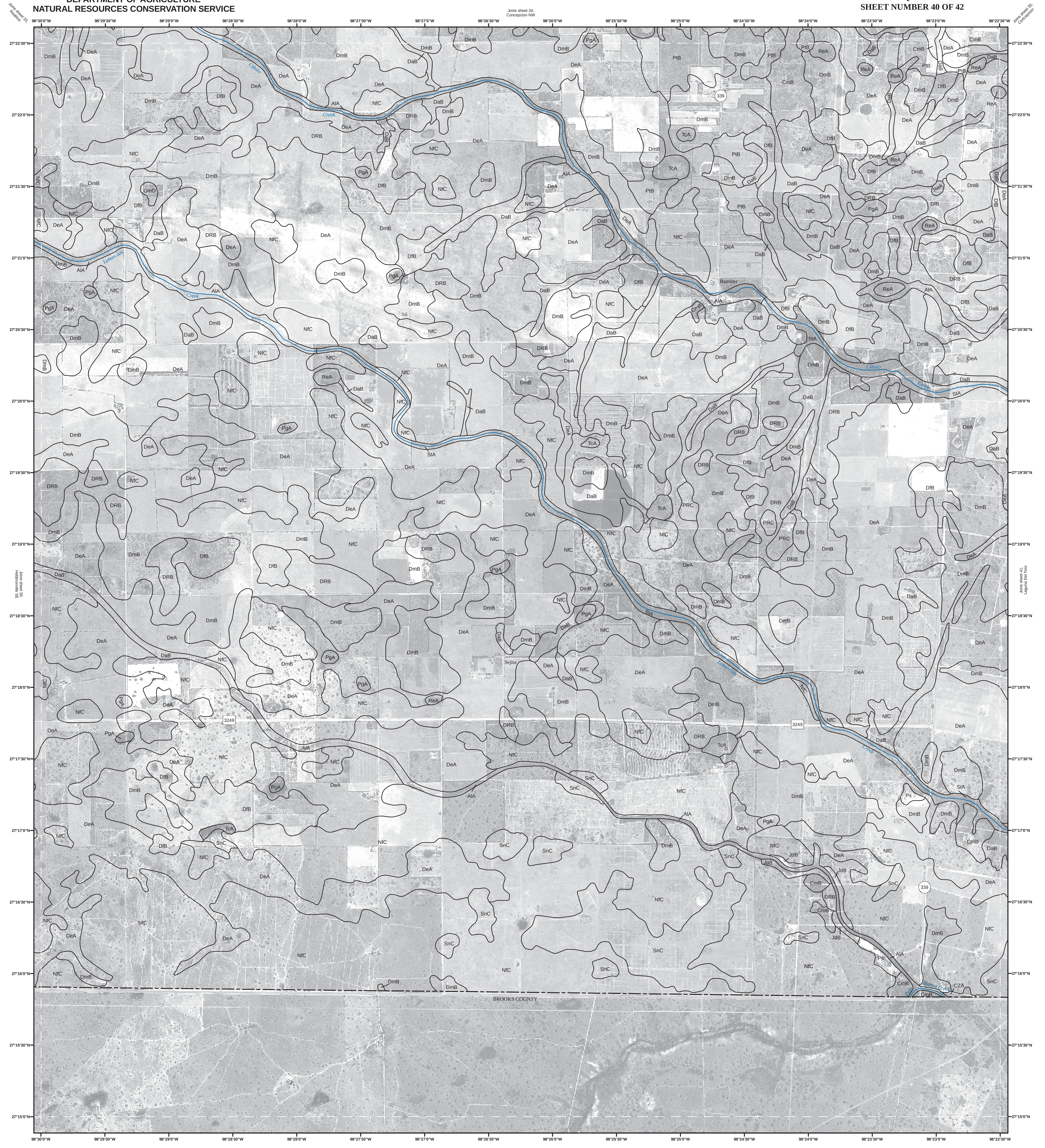
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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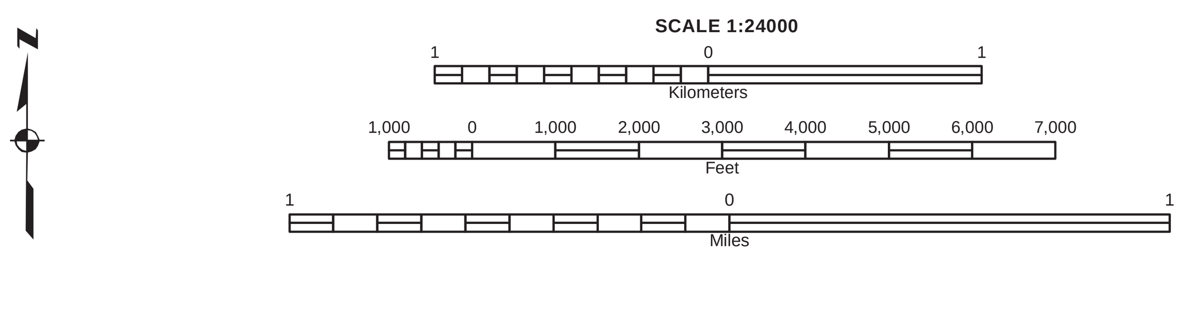
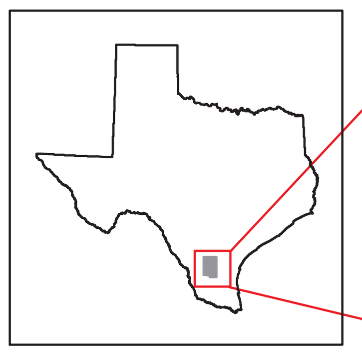
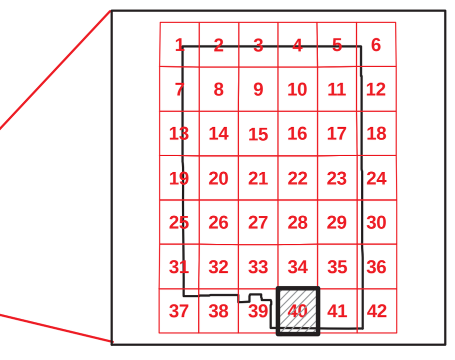




DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

RAMIREZ, TEXAS

7.5 MINUTE SERIES

SHEET NUMBER 40 OF 42

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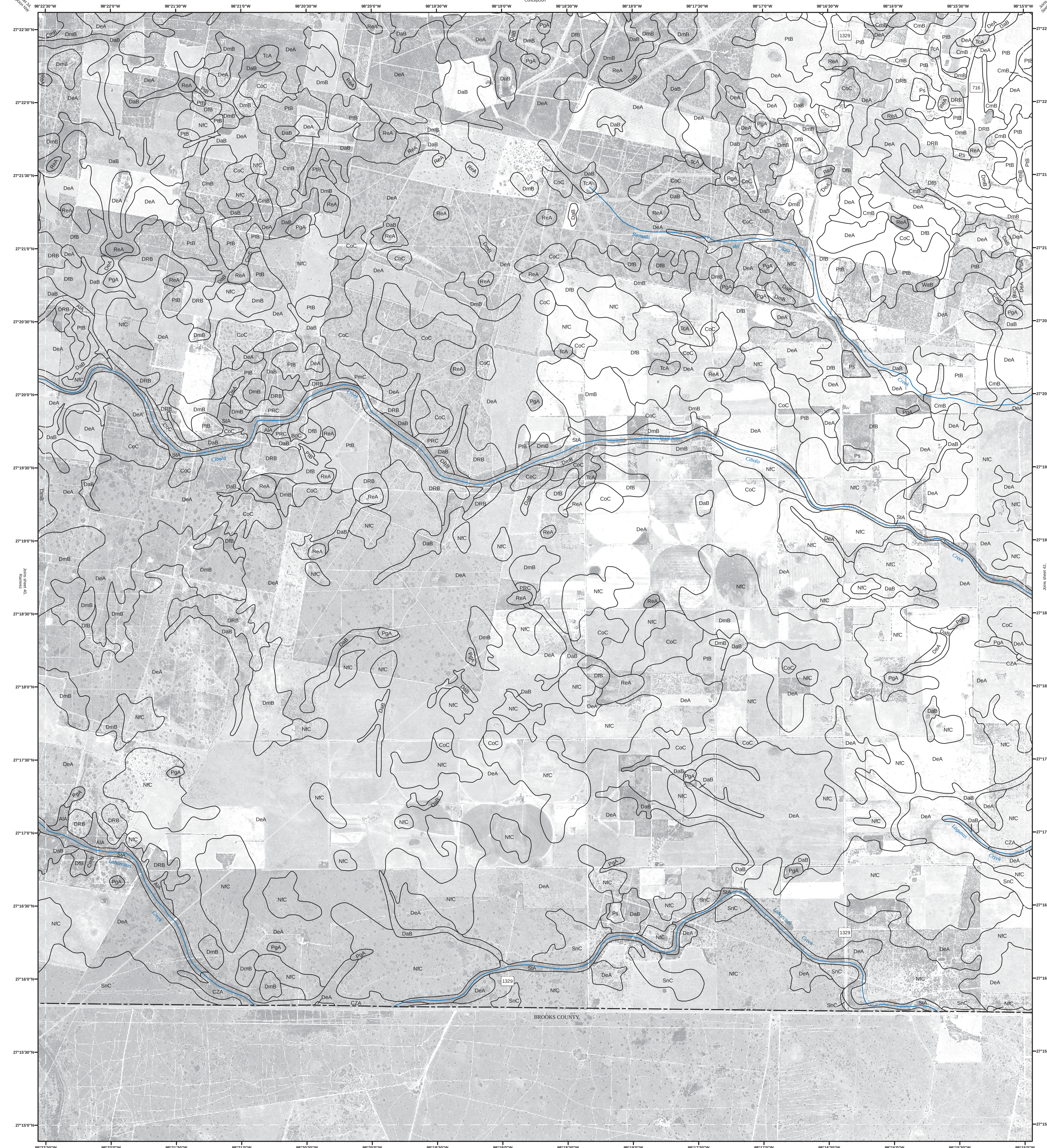
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
LAGUNA DEL TORO QUADRANGLE
SHEET NUMBER 41 OF 42



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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
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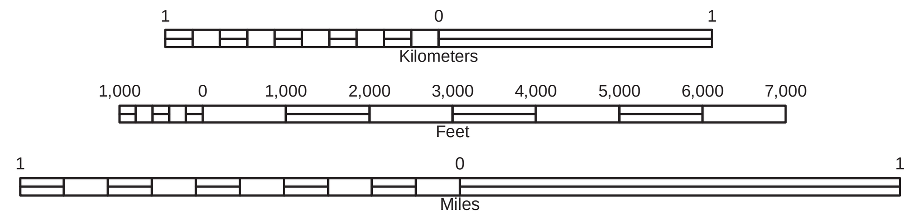
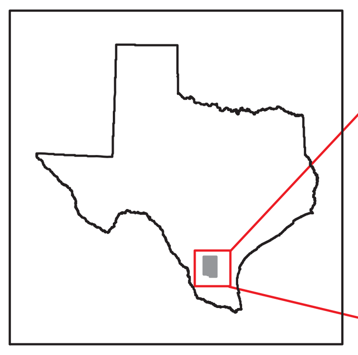
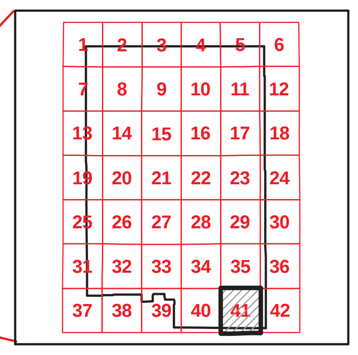
SCALE 1:24000





DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

LAGUNA DEL TORO, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 41 OF 42

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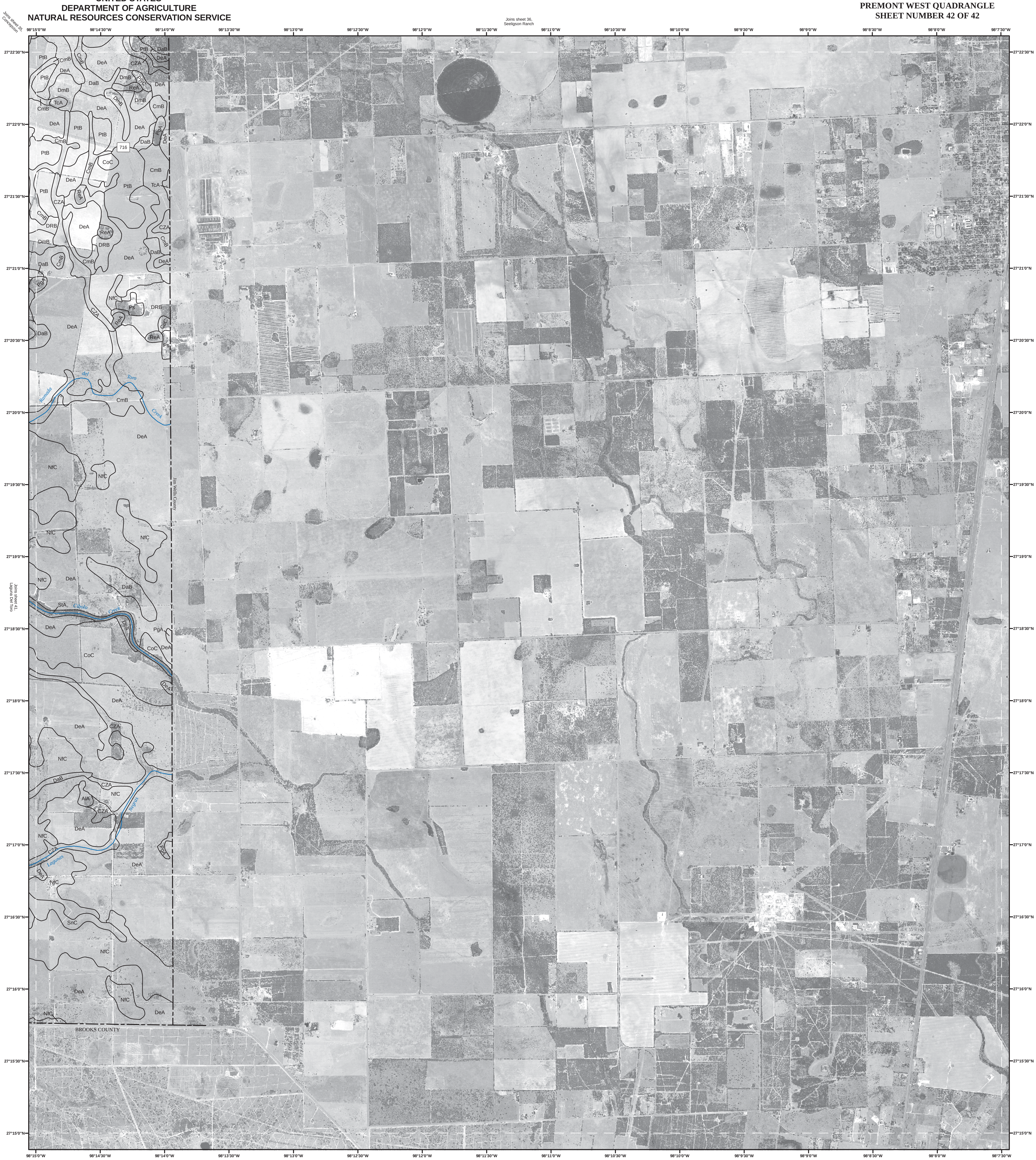
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

DUVAL COUNTY, TEXAS
PREMONT WEST QUADRANGLE
SHEET NUMBER 42 OF 42



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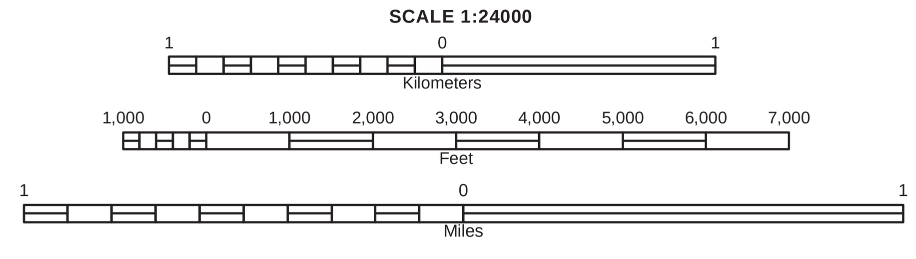
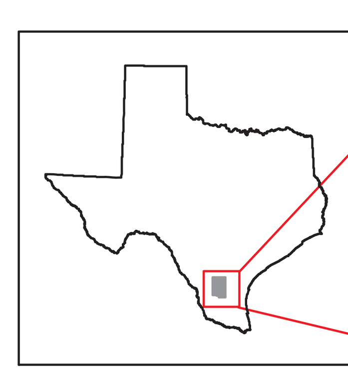
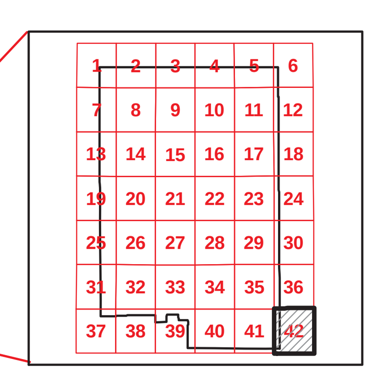




DUVAL COUNTY LOCATION



QUADRANGLE LOCATION

PREMONT WEST, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 42 OF 42

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